MOTOR AGE

Vol. XXXIII
No. 16

CHICAGO, APRIL 18, 1918

Ten cents a copy
Three dollars a year

Whose Fight is This?
Your's? His?
Or Both?
Better Buy Another—
LIBERTY BOND

THIS SPACE AND DESIGN CONTRIBUTED TO THE WINNING OF THE WAR BY Straw Bearings Formerly U.S. Ball Bearings U. S. BALL BEARING MANUFACTURING CO. CHICAGO ILL.

Editorial Contents—Page 3

Advertisers' Index—Next to Last Page

In This Issue—Training Motor Experts for Ordnance Department

The New Improved UTILITY Universal Rim Wrench

Is the Most Serviceable Tool for Motor Car Use

Belongs in the Tool Box of Every Motor Car

Price $1.50

Indispensable in the Service of Every Going Garage or Repair Shop

One Tool Fits Every Nut

The UTILITY Universal Rim Wrench is built in only one size—yet it automatically fits every nut on every demountable rim. In the tool box of the motorist, in the stock or the shop of the garage or repairman, it is small enough to be always out of the way—except when you need it. Then it is always ready for use—a single tool that fits, holds, and turns any nut.

The new UTILITY Universal Rim Wrench is beautifully finished in nickel and black enamel. It is more compact and lighter, and built with practically unbreakable jaws. It is shortened to go into the tool box without folding, and is absolutely rigid in action—a stronger brace that cannot close up or slip while in use by the operator.

HILL PUMP VALVE COMPANY, Archer Avenue and Canal Street, Chicago

DISTRICT OFFICES:

New York.....149 Church Street
San Francisco....149 New Montgomery Street
Los Angeles.....Title Insurance Building
Seattle.....L. C. Smith Building
Kansas City.....Rialto Building

Ask Your Dealer for It NOW

DEALERS, order from your jobber. One of these tools used in your own shop will be a money-maker for you. Sells on sight to car owners.

MOTOR AGE

Published Every Thursday by the
CLASS JOURNAL COMPANY
Mallers Building
CHICAGO ILLINOIS

Entered as Second-Class Matter September 19, 1899, at the Postoffice at Chicago, Illinois, Under Act of March 3, 1879—Member of the Audit Bureau of Circulations—Copyright, 1917, by the Class Journal Co.
United States, Mexico and U. S. Possessions.One Year $3.00
Canada .....One Year $5.00
All other Countries in Postal Union.....One Year $6.00
BEWARE OF SUBSCRIPTION SOLICITORS OFFERING PREMIUMS OR CUT RATES—ALL CURRENCY SHOULD BE SENT BY REGISTERED MAIL.

RENEWALS or CHANGES OF ADDRESS should be sent two weeks in advance of date they are to go into effect. Be sure to send old as well as new address to avoid unnecessary delay. RECEIPT of first copy is acknowledgment of subscription.

Vol. XXXIII Chicago, April 18, 1918 No. 16

Contents

TEACHING ORDNANCE MOTORS..... 5
SEEK U. S. ROAD APPROVAL..... 10
EDITORIAL 12
365-Day Roads—The Internal Combustion Engine —The Gasoline Situation.
MORE GASOLINE TO ALLIES..... 14
WOULD CORRELATE TRANSPORTATION..... 26
RESULTS OF HEADLIGHT TEST..... 24
OUR WONDERFUL CAVE..... 26
AIRPLANE CONSTRUCTION SCHOOL..... 30
ELECTRICAL EQUIPMENT OF THE MOTOR CAR 32
MOTOR DEVELOPMENT 42
Case type B tractor described and illustrated.

DEPARTMENTS

MOTOR CAR REPAIR SHOP..... 35
READERS' CLEARING HOUSE..... 36
ACCESSORY CORNER 44
AMONG THE MAKERS AND DEALERS..... 46
FROM THE FOUR WINDS..... 48

NEXT WEEK
Flashes from an Airman's Flight.

"NORMA"
BALL BEARINGS
(PATENTED)

As the success of an organization rests upon the capacity of the men comprising it, so does the success of a machine depend upon the integrity of its parts. To sacrifice quality for price in any part of a machine, is as fatal as to place an incapable man in an efficient organization. There can be no more short-sighted fallacy.

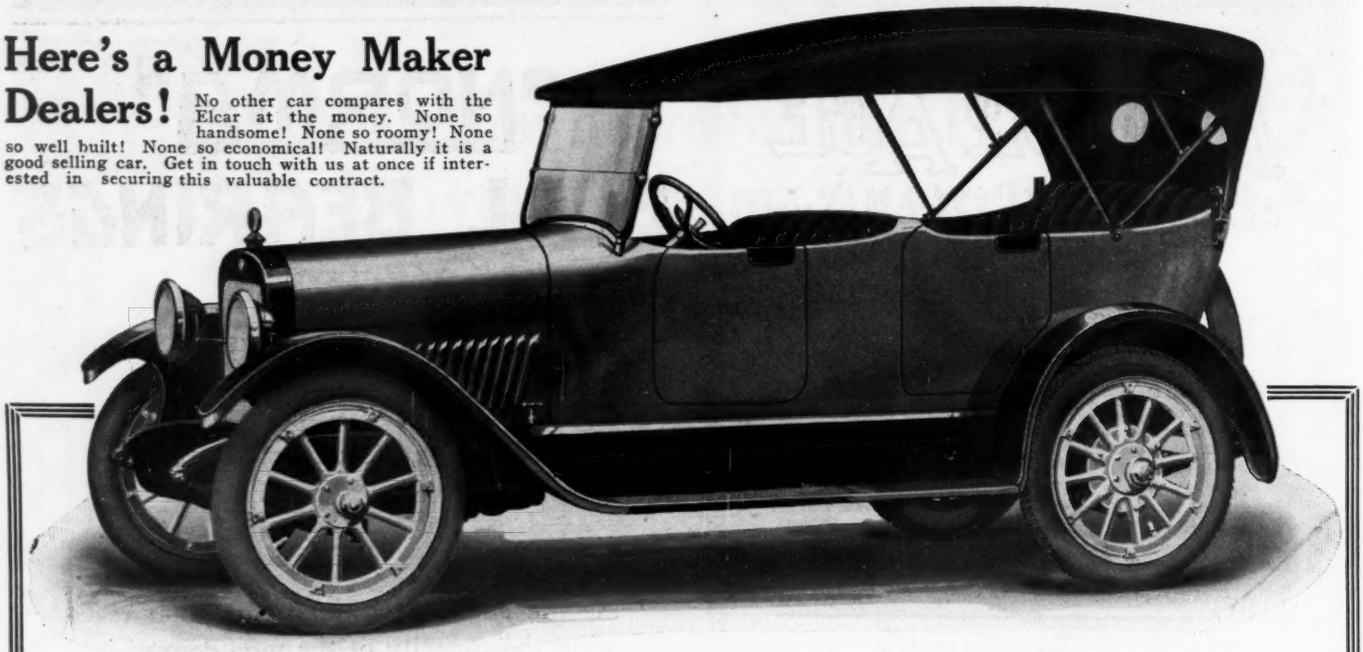
Day-in-and-day-out dependability has uniformly been the distinguishing characteristic of the high-grade ignition apparatus and lighting generators in which "NORMA" Precision Bearings have been the standard bearings. Their record is not one of days or months, but of years.

Be SURE. See That Your Electrical Accessories Are "NORMA" Equipped.

THE NORMA COMPANY OF AMERICA
1790 BROADWAY NEW YORK
Ball, Roller, Thrust and Combination Bearings

Here's a Money Maker Dealers!

No other car compares with the Elcar at the money. None so handsome! None so roomy! None so well built! None so economical! Naturally it is a good selling car. Get in touch with us at once if interested in securing this valuable contract.



Biggest Car Value of 1918

Elcar Four-cylinder Touring Car and Roadster. . . . $1095

Elcar Six—Touring Car and Roadster $1295

The Elcar offers a combination of beauty, comfort, built-in quality, low upkeep and **value for the money** without equal.

It is the roomiest car of any selling at as low a price as $1095—with 116 inch wheel base and body designed to make every inch of space count. This, together with the excellent springs and deep upholstery, gives **real riding comfort.**

Elcar owners are not worried by upkeep bills. 18 to 24 miles are averaged to the gallon of gasoline—1000 miles to the gallon of oil. Tires give long service, due to light weight and proper balance. Repair expense runs very low, for every Elcar part is built 150 per cent strong. It will give you dependable service for years and **hold its good appearance.**

The Elcar is equipped with a motor of high reputation. It's responsive and flexible. It develops more power and speed than you'll likely care to use. You won't need to take anybody's dust, on the level or on the hills.
Don't think of choosing a car until you have seen the latest Elcar—the masterpiece of a concern that has been building vehicles since 1873.

CATALOG ON REQUEST. Fully illustrates and describes the 1918 Elcar models. We gladly mail it to anyone interested. Also ask for nearest dealer's name, if you don't know him.

Brief Mention of Elcar Points and Prices

Four-cylinder models have powerful long stroke Elcar-Lycoming motor, developing 37½ horsepower at 2,100 r.p.m. Six-cylinder models have famous Continental 3¼" x 4½" engine, developing 40 horsepower at 2,100 r.p.m. Outside of the power plants, the Elcar sixes and fours are practically the same. Two unit electrical system. Long wheel base, 116 inches; road clearance, 10½ inches. Full floating rear axle with spiral bevel driving gears. Timken Roller Bearings front and rear. Double universal drive; tubular propeller shaft. Copper cellular radiators.

A wonderfully easy riding semi-elliptic spring suspension. Roomy and comfortable bodies of beautiful design and durable finish; new "Cathedral Pipe" upholstering. Equipment complete, even to motometer on radiator.

ELKHART CARRIAGE & MOTOR CAR CO.

C781 Beardsley Ave.
Elkhart, Indiana

Vol. XXXIII, No. 16 Chicago, April 18, 1918 $3.00 Per Year

MOTOR AGE

Teaching Ordnance Motors

Instruction is given in the building, operation and repair of the Holt caterpillar tractors and trailers at Peoria, headquarters of the schools, and the students get actual practice in operating the caterpillars

By Darwin S. Hatch

Editor Motor Age

TO make military officers out of motor car men and at the same time to make motor car men out of army officers is the task that confronted the Ordnance Department of the Army when it realized the extent of the use of motors in modern warfare and the necessity of vastly expanding its motorization if it was to keep pace with the armies of Europe. The thousands of tractors needed for hauling the big guns and the thousands of trucks for the transportation of ammunition and supplies for them immediately made necessary a big organization of skilled drivers and—what is just as necessary—skilled repairmen.

Not only was it necessary to provide trained drivers and mechanics, but it was just as necessary to see that there were as officers executives who could operate the repair plants efficiently. They had to have officers and men who could judge in the heat of battle whether to attempt a repair to a tank amid the shells of No Man's Land or to attempt to get it back to a repair base or gracefully abandon it.

Students by Hundreds

Not many have heard of such a college as the Ordnance Motor Section Instruction School. Yet there is such an institution whose students number in the hundreds and whose alumni are mostly in France. Last October there arrived in Peoria, Ill., quietly and unannounced, seven first lieutenants of the Ordnance Department of the United States army under Lieut.-Col. Harry T. Herring—then Captain Herring.

None but the high powers in Washington, the officers mentioned and one or two officials of the Holt tractor plant knew its purpose. Few realized as they saw the small group of officers that they formed the nucleus of one of the important factors for the success of the United States army in Europe—the headquarters of the Ordnance Motor Section Schools. They called it Camp Herring in honor of its founder, and since then over 1500 officers and men have been given a course in intensive training for the proper handling and repair of the caterpillars which are later to go abroad.

To move the big guns from place to place, to follow up the retreating Germans, as soon must be their duty, to keep the guns, the tractors and the ammunition motor trucks working at the highest efficiency, to keep all this mechanism on the job every minute is what the soldiers at Camp Herring are learning to do.

Contrary to general opinion, the motor section men will not be miles behind the lines in safety or in bomb-proof dugouts all the time. When a gun or a tractor or a truck becomes hors du combat, it is their

Lieut. Arthur Chapple, formerly amateur motorcycle champion, finds a Holt 75 somewhat harder to start than his motorcycle, sometimes

duty to go out into the fire zone and either repair it in a rain of shell and shrapnel or bring it back to safety.

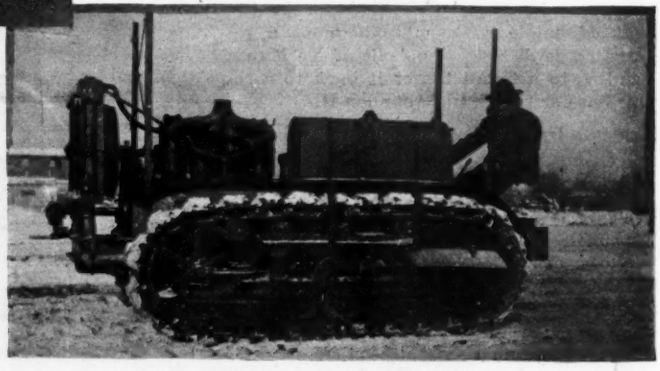
The Ordnance Motor Instruction Schools are five in number, the one at the Holt plant at Peoria being the headquarters. Lieut-Col. Herring is in command of all the schools, the others being located at three plants where ordnance trucks are built and the fifth, or finishing school, at the arsenal at Rock Island, Ill. At Peoria, of course, the men and officers are instructed in the building operation and repair of the Holt caterpillar tractors and trailers. At Kenosha, Wis., a second school is operated at the plant of the Nash Motors Co., where the Government Quads are built. There are similar schools at Clintonville, Wis. and Racine, Wis., where the F-W-D trucks are made, the Racine school being the Mitchell factory. At these plants the work is concentrated on the type of vehicle being produced there. Those who go to Racine rarely take in the Clintonville school also.

Lieut-Col. Harry T. Herring, head of the Ordnance Motor Section Instruction School, with headquarters at Peoria

Somewhat different in what is studied, but toward the same end, is the school at Rock Island Arsenal. Here the student begins to realize what war means. This is the final, or finishing, school of the course. Many of the men never get that far. A great many are sent to France before they reach that stage, so great is the call for skilled men over there. If he gets to Rock Island, the first thing he sees is the big guns, the 3-in. and 4.7 rifles, cannon and 4.7 and 6-in. howitzers. He is taught to assemble and repair them. A few weeks with the infantry equipment, harness, Springfield rifle, automatic pistols, rapid-fire guns and motor machine shops and the soldier is ready for the Western Front.

The first school was started Aug. 10 at Kenosha, Wis., by Lieutenant-Colonal Herring with fifteen officers. This small group was known as the first class. From this small beginning it has grown under his command to a vast organization, consisting of four plants, using many thousands of dollars' worth of equipment and teaching hundreds of officers and enlisted men. There have passed through the schools and over to France since August, 1917, 500 officers and nearly 2000 enlisted men. Most of the student-soldiers start their course at Peoria, where in addition to the technical instruction they are given as complete a course in the school of the soldier as will permit in thirty days.

Each school has its monthly quota of 150 to 200 men, who are selected from the drafted divisions, or enlisted men who express a preference for the motor service, either as drivers or mechanice. Also each has its quota of officers taking the same course. The daily routin of duty is practically the same at each camp. After reveille at 5:30 a.m. comes breakfast. After the morning meal the men are given 45 min. of infantry drill. Setting up exercises are not ordered, as the training on the field in



Glimpses of the students and their work at the Ord nance Motor Section Instruction Schools. Work went on, snow or no snow. There are five of the schools and instruction varies somewhat according to the ordnance manufactured at the site of each school

A wet practice field. Actual war conditions are duplicated in many cases at the schools. But the work goes on just the same over muddy fields, rough ground and snow-covered dirt

handling the big machines is regarded as ample physical development. From 9 a. m. until 12 noon and from 1 p. m. to 4:30 p. m. the men hear lectures on the methods of driving or repairing, are given problems in overhauling to work out or in other ways are taught how to handle the great machines on good, bad or indifferent roads, over obstacles or under all kinds of possible difficulties. The field adjoining Camp Herring is undulating and has a number of gullies. The students are taken out to the fields in squads under competent instructors.

Comfortable Barracks

At Camp Herring comfortable barracks of two stories serve as mess halls and dormitories for the enlisted men. They are well lighted, well heated and well ventilated, and even in the extreme cold weather of January the men had no complaint. The officers are quartered in separate buildings. Many of the students are sent to the schools at Rock Island and also in Wisconsin, where it is desired that they take all branches of the motor instruction. Horses and mules rapidly are being abandoned for hauling ordnance, and motor power is being substituted. Artillerymen, who formerly were assigned to duty as drivers of the horses, now are being instructed in the science of the gasoline engine.

One of the curious things that strikes the visitor at the classrooms in the long wooden school buildings at the Holt plant is the officers taking instruction from some mechanic of the factory. Officers and men take practically the same course, for the former must know how a thing should be done as much as the men they must order to do it. In addition to their training in the mechanics of the trucks and tractors, the officers get military schooling as well.

Most of the officers, in fact, know more about motors than they do about military etiquette or military law, for they are nearly all reserve officers commissioned from civilian ranks on account of previous experience in the motor field. A few, however, at the beginning were not well versed in things motor as might be expected. They tell the story of one recently commissioned captain during the first few weeks of the school who, when asked whether a spark plug should be removed while the engine is running, replied: "No, the spark plug would be revolving too fast."

Needless to say, there are few experts of that caliber among the commissioned men who have gone through the schools. Many names that have been high in the rolls of motor racing and road contests are on the rolls of the school and some that bear those names have graduated and are serving in France.

Racing fans know Tom Orr of the Maxwell team, T. W. Pepperday, who drove the Simplex at the Savannah races, Walter Knowle, an Indianapolis star; Clarence Barnard, who made the road racing record with the Stoddard-Dayton; W. F. and Wallace Robertson brother of George Robertson, who is now a major; Charles G. Percival, who laid out the Bulldog trail; Horace Abbott Gate, who drove the first car into Baltimore, now a captain and assistant to Lieutenant-Colonel Herring; Billy Weightman, son of the racing man. Then there is no less a man than Arthur Chapelle, world's motorcycle champion.

There are others whom we have known in the industry: Maurice Walter, engineer of the Walter truck, who is now in France; H. E. Ducks, motor editor of the Washington Post; James E. Delong, engineer of Rutenber motor and others.

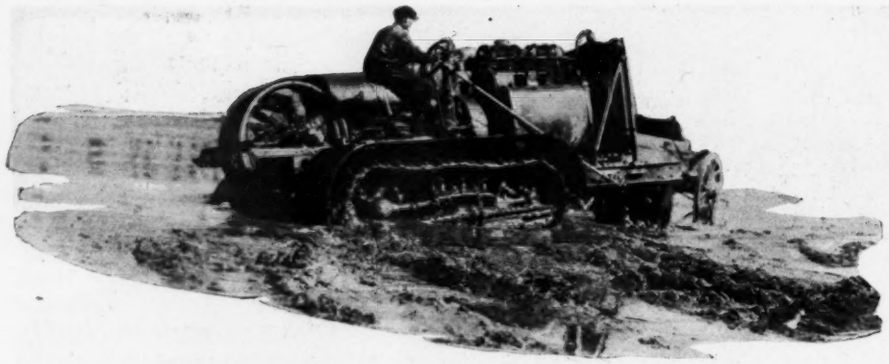
Names there are, too, famous in other fields: C. V. Herbert, son of Victor Herbert, the composer, and Townsend Netcher, son of the owner of the Boston store, Chicago.

If the officer or enlisted man is not called into active service, usually in France, it takes about three months to complete the course. Peoria takes thirty days, Kenosha, three weeks, Clintonville or Racine, three weeks and Rock Island three weeks or over. A little more complete course in some features is given at Peoria. For instance, there is a welding school in which the men are taught to repair broken castings, a most necessary accomplishment on the other side. Very complete welding equipment has been supplied by two large welding companies. In fact, much of the practical equipment of the schools has been supplied through the courtesy of the manufacturers of different apparatus and more could be used.

Motorization of the army has been rather a new thing in this country and it has had such a rapid expansion that the personnel cannot keep up with it. By these schools the Army is training its men and officers in a most vital branch of the service.

In 1902 or 1903, when the younger offi-

Barracks for the soldiers at the tractor school at Camp Herring, headquarters for all the schools



Hard going through mud and water at Camp Herring. But the tractor goes on just the same and the student learns that much more

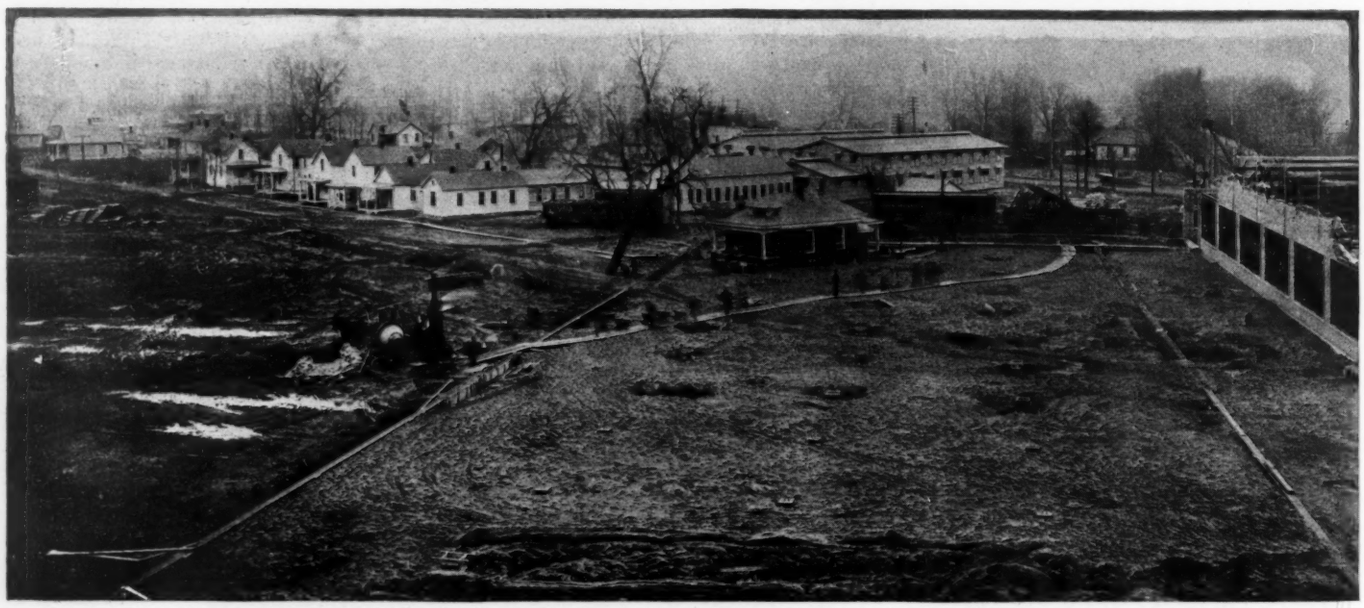
cers of the Army heard of the motor car and looked over the American field of motor cars of the time, they thought it would be a splendid thing for the rapid transportation of the Army. Government adoption and fostering was brought up but downed by the conservation element as too radical. The radicals persisted until 1915, when they succeeded in getting a few manufacturers to study the military needs and enter an unofficial test at Fort Sill, Okla., at the School of Fire. The tests were deemed satisfactory and the Holt tractor, the F-W-D 3-ton truck and the, at that time Jeffrey, now Nash Quads, were victorious. The test resulted in the Government finally trying the motorization of a whole regiment of 3-in., 4.7-in. and 6-in. guns located at Honolulu, through the efforts of then Captain Capron, now Major Capron, and Col. L. B. Moody of the Ordnance Department.

During 1916 there were no motorized artillery units at the border, although Captain Capron succeeded in getting his company motorized with Holt tractors. In the maneuvers that year at Fort Bliss, Tex., the motorized company showed up quite successfully.

In the meantime considerable agitation was started in favor of motorization of all artillery units. The artillery board, the deciding factor, took up the question. Of the five men on the board one was opposed, one favorable and three were on the fence. Through the efforts of the favorable officer an adverse decision was staved off until influence could be brought to bear on a change of personnel. During the last several years Colonel Moody had been working during his spare time steadily and quietly for motorization, assisted by Major Bryden.

When the present hostilities opened, nothing had been accomplished and the artillery board was stirred up by the retirement of one officer and placing Captain Capron in his place. Colonel Rice of the equipment division then turned Colonel Moody loose with carte blanche. Inch by inch gains were made and by July a scheme had been worked out and approved by the board and adopted and O. K.'d by the Ordnance Department.

Men were necessary for this work and in a vague way schools were thought a possibility. This did not crystallize until one Mr. Harry T. Herring, a former army lieutenant and West Point graduate whose health had made it necessary to resign, came back to Washington, seeing blood on the moon and clamouring for action. He was placed in charge of the school and went at it enthusiastically. Nothing definite had been done so the entire work was creative. Although contracts were not signed, it was decided, due to the lack of time, to take the results of the 1915 tests at Fort Sill and use the Holt tractor, the F-W-D 3-tonner, and the Nash 2-ton Quad.



Above is a group of students and instructors in the Ordnance Motor Section Instruction School at the Nash plant in Kenosha, while below is a view of the barracks, showing new construction, at the right

Another truck full of soldier-students at Kenosha. Each school teaches the type of vehicle made there, in this case the F-W-D truck

The three schools then were selected at the shops of the three manufacturers.

On Aug. 10, Herring, who had been made a captain in the United States Reserves, was informed that fifteen officers were to be sent to the Nash plant at Kenosha and the instruction schools of the Motor section of the Ordnance Department were started. Whether the Ordnance Department would furnish drivers, repairmen and assistance to the artillery in the field, no one knew. Before the end of August it was decided to also add a six weeks' course at Rock Island Arsenal on the maintenance of leather goods, such as saddles and harness and canvas equipment, which come under the care of the Ordnance Department, and a course in guns and other field artillery equipment, such as store wagons, forge limbers and caissons. A course in military correspondence and officer paper work also was included.

The first class completed the Quad course and was sent to Peoria, Ill. Here the class rapidly was broken up, some of the men going to France, others to various details in America.

Thirty Days

The course was revamped many times until today it comprises thirty days' training in tractor work under competent instructors, former service men of the Holt company under Chief Instructor F. L. Peterson, who has prepared a series of questions covering each day's work. These questions have to be prepared and turned in as a report every evening. They cover the work of the day, which may have consisted of taking off the whole side of a tractor or repairing or soldering radiators or building up a magneto from the parts.

All the time while at the Holt plant, the student officer and enlisted man is given every opportunity to learn everything about the Holt tractors he can crowd into four weeks.

At the Nash plant the course is now three weeks long, embracing practically all the work that may come up under any war conditions. The student officers and enlisted men help build the trucks from the wheels to the top of the body. Squads of five men build a truck complete in two days under the eye of Government inspectors, who accept it for the Ordnance Department.

At Clintonville the same serious attention is given to the F-W-D where the men spend twenty days delving in the depths of the 3-tonner. When Rock Island Arsenal is reached, the personnel of the motor section really have to work, getting down to brass tacks, for automatic rifles, model 1917 rifles, howitzers and guns up to 6-in. type are taken apart and rebuilt and they are all Greek to the members of the Motor Section Instruction Schools. Lectures are given on all features of the Ordnance work from some of the former instructors at West Point.

BOSTON MAKES CANVASS

Boston, Mass., April 13—Boston motor car dealers, garage, tire and accessory men are being canvassed thoroughly for the third Liberty Loan. After a meeting early in the week nineteen of the men present turned in pledges for $1,000 each as individuals to give the loan a start. Another $1,000 was added by a few of the others present. They all stated that this was merely a beginning, and did not represent the amounts their companies would turn in.

On the first day of the canvass George B. Kimball, chairman of the committee, received a pledge of $101,000 from Harry Noyes, the New England wholesale distributer of Buicks. No sum is set for the motor trade this time. On the second loan they put across more than $2,000,000 in a week with teams working. This time each of the forty committee men has from eight to ten firms to see, there being more than 300 in the trade in Boston. The heads of the firms are asked to look after the work in their establishments and to report to the man who made the canvass, the latter reporting to Mr. Kimball. Those comprising the committee represent all branches of the trade, car and truck dealers, tire, garage and accessory men.

K. C. HELPS DRIVE

Kansas City, Mo., April 13—Motor cars played a prominent part in helping the Liberty Loan campaign over the top in Kansas City this week. The dealers' association had undertaken the task of supplying cars for speakers, keeping four at the command of the speakers' bureau throughout the week, day and night. Scores of motor cars, their use obtained by a transport committee, carried the captains and commanders of the local drive and the flying squadrons. Trucks, contributed by motor truck dealers, were used to carry theater groups and other entertainers through the downtown streets.

While the Liberty Loan drive was organized without calling on business men's organizations for special help, every organization had solicited its own membership to secure volunteers for the general campaign committee. The Motor Car Dealers' Association was far in the lead in proportionate number of volunteers. The branch house contributions were away ahead of similar subscriptions in previous loans. Several motor car dealers used display space in the newspapers to exploit the loan.

PHILADELPHIA FORMS TEAMS

Philadelphia, Pa., April 2—The Philadelphia Automobile Trade Association has divided its Liberty Loan campaign committee into three groups for cars, tires and accessories, and it is planned to sell $1,000,000 worth of bonds. By way of stimulating effort ten teams have been appointed in the motor car group.

More Work for Horning

To Have Supervision Over Entire Automotive Industry in New Organization

Purchasing Is Centralized by Requirements Division

WASHINGTON, April 12—H. L. Horning, chairman of the automotive products sections of the War Industries Board, is to represent centralization of purchases for all automotive products in connection with the requirements division recently established and reported in the issue of last week. He will have general supervision over the entire industry, orders placed and materials and production problems. He will not enter into the immediate details such, for example, as inspecting products for which orders have been placed.

All supply divisions and purchasing departments and the Allied Purchasing Commission requiring automotive products will submit statements to the requirements division of their requirements for raw materials and finished products as far in advance as possible. The requirements division in turn will delegate the task of fulfilling these needs to H. L. Horning or in some instances where there is no problem connected with the supply or production to the supply departments themselves.

Furnish Fuel Data

The statements furnished the requirements division will include every commodity regardless of a threatened or present shortage or an ample supply. It is hoped by this to prevent that shortage of materials which is the result of badly planned distribution.

In consequence of this new organization, which includes representatives of each section of the War Industries Board, the Army, Navy, Emergency Fleet Corp., Food Administration, Red Cross, Fuel Administration, Railroad Administration and Allied Purchasing Commission, Mr. Horning's scope will be considerably broadened.

He will be charged with the responsibility of collecting all information regarding trucks, passenger cars, tractors, motorcycles and tanks, including production, available supplies, new sources of supply, methods for increasing production, etc., and will also act as the point of contact representing the requirements division with the several departments of the Government, the manufacturers and producers, Hugh Chalmer's National Automobile Chamber of Commerce committee, A. W. Copeland's Motor & Accessory Manufacturers' Association committee, and those war service committees under the supervision of the United States Chamber of Commerce.

He will be the sole Government agency for dealing with the automotive industries. He will co-operate with the price fixing committee and the priority division, furnishing them the necessary information to enable them to accurately perform their functions in so far as automotive products are affected. It is hoped that through this new arrangement there will be no such confusion as has been created in the past when for example, each of the many departments issued similar questionnaires and caused needless duplication of effort to the business men of the industry.

In addition to dealing with the problems already referred to the automotive products sections also will consider from time to time the extent of the existing sources of production, creation of new facilities, conversion of existing facilities and the opening of new sources of supplies whenever these problems enter into matters automotive.

The section also will consider market conditions and when advisable recommend purchase plans to the various buying departments. If it should ever become necessary to control the industry in whole or in part by means of allotments, this will become one of the functions of the automotive products section.

BIJUR REVIVAL SEEMS SURE

New York, April 15—It now appears certain that the reorganization of the Bijur Motor Lighting Co. and the entry of General Electric interests into the company will be effected. The Bijur company was placed in the hands of a receiver last January. The creditors' committee has been looking toward a reorganization or a liquidation of the affairs of the company. Liquidation was made impossible by the fact that the Government had requisitioned the Hoboken building and that it required starters, made under Bijur patents, for airplanes and motor trucks now building. The General Electric Co. has proposed to take over the management, control and assets of the Bijur company, either through acquiring stock in the company or forming a new company, and will contribute at once as working capital $300,000 cash and $200,000 additional as required. Creditors will receive notes of the Bijur company, or its successor, for the full amount of their claims, the notes to bear interest at 7 per cent and run for ten years. Of these notes $50,000 will be retired each year.

DODGE ADD TO LINE

Detroit, April 13—Dodge Brothers are putting out a new panel business car which will sell for $935. The dealers already have been supplied with sample cars, and production will be increased from day to day.

TO AUCTION OLD HAL STOCK

Chicago, April 13—The entire stock of supplies, accessories, machinery, furniture and ten finished cars formerly belonging to the Hal Motor Car Co., Cleveland, Ohio, will be auctioned by Samuel L. Winternitz & Co., Chicago auctioneers, at Cleveland April 26. The inventory value of the concern is given as over $200,000.

CONTINENTAL RUSHES WAR WORK

Muskegon, Mich., April 12—The Continental Motors Corp. is operating day and night shifts on a Government order for Class B truck engines. More than 3500 men are now employed at the Muskegon plant of the company in order to rush this work to completion.

Seek U.S. Road Approval

Good Roads Convention Opens with Proposal to Ask Federal Sanction

Would Issue Necessary Bonds for Highways

LITTLE ROCK, Ark., April 15—Special telegram—Need of Federal recognition of the immediate necessity of highway improvement in this country as a war measure will be the message of the United States Good Roads Association convention here this week if the opening session this afternoon is a criterion. In extending the welcome of his state to the delegates Governor C. H. Brough of Arkansas voiced the sentiments of the 225 delegates from twenty-one states when he asked the convention to send to President Wilson and Director-General McAdoo a resolution asking the Federal Reserve Board to approve at once necessary bond issues for the improvement of all the National highways, as all are of immediate importance to our prosecution of the war. He pointed out that the first 10 miles of the journey of a ton of grain to the trenches is as important as the last 10.

The convention will be in session to-day, to-morrow and Wednesday and will be addressed by Senator Bankhead, its president and a father of the Federal Reserve Board, and state highway engineers. Thursday and Friday will see a convention of the Bankhead National Highway Association, which is boosting a transcontinental highway through the Southern states.

HIGHWAY WORK TO START

Trenton, N. J., April 13—Construction of New Jersey's proposed $15,000,000 state highway system will be commenced about May 1. America's entry into the war had set back the plans made in the fall of 1916, and the taking of Major General George W. Goethals from the post of chief engineer of the highway department back to service for the Government upset calculations considerably, but, obstacles having been removed, the work will be pushed ahead now.

The permanent hard-surfacing of all the principal roads in the state is expected to cover a period of about five years, and only those roads of economic and stragetic importance will be improved during 1918.

DODGE-FORD AWAITS DECISION

Detroit, April 12—Decision in the Dodge-Ford suit now lies with the supreme court for final adjudication. The arguments have been made. The real legal battle lies over the intention of the legislature when it framed the corporation law limiting a corporation to $25,000,000 capital. The Ford attorneys insist that capital means merely the capital stock alone and not the capital assets. This would make the Ford company with its $2,000,000 capital stock perfectly legal. The Dodges insist that the limit is on capital assets, which would bar the

$126,000,000 accumulation of the Ford company and thus force a dividend.

The closing 2 hr. of argument were taken entirely by Alfred Lucking and former Judge Alexis C. Angell for Mr. Ford and Elliott G. Stevenson for the Dodges. While all three confined themselves considerably to the legal aspect of the case, the first and the last indulged in some oratorical fireworks. Mr. Lucking insisted that it behooved the supreme court of Michigan as a protector of the public to side with Ford. The Dodges and John S. Gray were given full credit for the wonderful engine and not Henry Ford by Mr. Stevenson. Ford, he said, always wanted to build racing cars while Mr. Gray insisted they come to a low-priced car, which was done, and the company prospered.

FALL SHOW TAKES WELL

Chicago, April 16—If the letters that are being sent to the headquarters office in this city are to be taken as an indication the official endorsement of a fall show by the National Association of Automobile Accessory Jobbers will be only a formality.

Since the idea was suggested by Commissioner William M. Webster many jobbers and manufacturers have written to him stating with enthusiasm that the idea is good, all of which looks as though the Hot Springs convention in June may endorse the idea without much adverse discussion.

HARROUN GETS BIG WAR ORDER

Wayne, Mich., April 12—The Harroun Motors Corp. has received an order for a large quantity of 155-mm. shells, and is installing $500,000 worth of new machinery to produce them. Vice-President Ray Harroun is devoting a major share of his personal attention to the consequent revision of plant arrangement, a step which is being taken without interrupting the regular motor car production.

STUDEBAKER COSTS MORE

Detroit, April 15—The Studebaker Corp. increased the factory prices of its models to-day as follows:

MODEL	NEW PRICE	OLD PRICE
Touring four	$ 995	$ 895
Light touring four	1,395	1,295
Big six touring	1,795	1,695
Roadster	1,550	1,450
Chassis	1,295	1,200

OLDS TO MAKE INCREASE

Lansing, Mich., April 15—The Olds Motor Works will increase the price of its eight-cylinder open models May 1. The present price is $1,495; this will be increased to $1,550. Prices of six-cylinder models probably will remain unchanged, the open models listing at $1,195, the coupe at $1,595 and the sedan at $1,695.

MORE STATES ORDER FORDSON

Detroit, April 16—Special telegram—Kentucky and Massachusetts each have ordered 100 of the Ford tractors to be distributed on the same plan as that used by Michigan, which has been described in other issues. It is understood these are trial orders and may lead to larger demands.

Marshall Report Soon

New Findings in Airplane Investigation Are Expected at Any Time Now

Air Department May Control Program

WASHINGTON, April 15—The publication of the report made by H. Snowden Marshall to President Wilson, which was considered in brief last week, is expected at any time. Mr. Marshall and his committee have been working night and day on the report, and it is now in the hands of the President. It is intimated that the committee will recommend a department of aeronautics to control all airplane production. Heretofore President Wilson has not favored the establishment of such a department, but it is believed that in light of the present airplane condition he will consider this new department more favorably.

The Senate Military Affairs Committee report was made last week. The report deeply scored the administration for having "misled the public" and offers as its opinion that the principal causes of delays have been the lack of centralized authority with power to make quick decisions and "ignorance of the art and failure to organize effort." In consequence the committee recommends that production be taken entirely out of the hands of the Signal Corps and controlled completely by one executive officer.

Though the general tone of the Senate Military Affairs Committee report is optimistic, it does not reveal much that has not been made public already, and except in a few places it does not tear away from the aviation program that veil of secrecy and mystery which has been so apparent and which has been so productive of derogatory rumors.

The report was not unanimous. It was adopted by the narrow margin of 8 to 6, after what is reported as a furious debate. Senator Sheppard of Texas was given leave to file a minority report, which report "does not believe that the report of the majority bears a proper estimate of what is being accomplished or that it is sufficiently complete to give an accurate estimate of the facts."

A report has it that E. R. Stettinius, formerly surveyor of purchases and just appointed second assistant secretary of war, may be placed at the head of the reorganized department. Other reports are that Howard E. Coffin will head the new organization. It is regarded as certain that production will be divorced entirely from any interference by the Signal Corps. Rumors that Howard E. Coffin will be shelved are met with positive denial from high officials. It is said that he will be used in a bigger and more valuable way. Mr. Coffin has been active only in an advisory capacity and his plans which were submitted to the Signal Corps have been changed frequently. It is stated that under the new scheme Mr. Coffin will be given more authority and wider initiative.

Official data filed with the report of the Senate Military Affairs Committee report show that the Gnome, Le Rhone and Hispana-Suiza engines, all foreign but being manufactured in America, are being used for advanced training planes and 965 have been manufactured. Five types of combat planes have been adopted at different times. Two were abandoned and three are now on the program. They include the Handley-Page, to carry six men, eight machine guns and a very heavy load of bombs, and to be driven by two Liberty engines; the DeHaviland, to carry two men, four machine guns, and a moderate bomb load, which is to be driven by one Liberty engine.

Fifteen of these have been finished and one of them is in France. The third machine is the Bristol, which is the lightest and fastest and is expected to make 125 m.p.h. It will be used as a reconnaissance machine and will carry two men, one machine gun and will be driven by one Liberty engine. The first Bristol machine was finished the last week of March, 1918. The committee in its report stated that it knew the full number of machines ordered in this country and abroad, but that it would be best not to make it public.

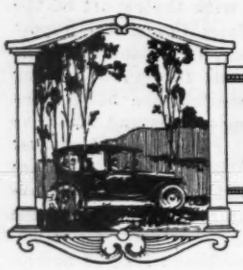
AIR LICENSES FOR CIVILIANS

Washington, April 13—Arrangements have been made to provide licenses for civilians who desire to operate airplanes over the United States, its territorial waters and its other possessions. Under the Presidential proclamations of Feb. 28 civilians are not allowed to fly without a license. Licenses can be obtained for operating balloons, airplanes or hydroplanes from the joint Army and Navy board of aeronautic cognizance by all aviators except Army and Navy officers. Applications should state the name of the operator, the machine to be used, names of passengers to be carried, identifying markings on the machine and other details to assure the military and naval forces as to the identity of the aircraft. The application should state when and where it is proposed to make the airplane flight.

By direction of the President Maj.-Gen. George O. Squier, chief signal officer of the Army, has been designated chairman. Col. H. H. Arnold and Lieut.-Col. Claude E. Brigham have been detailed to represent the Army. Capt. N. E. Irwin, Capt. T. R. Blakeley and Capt. F. H. Clark represent the Navy.

CONFER ON CURTAILMENT

Washington, April 12—It was definitely decided at a meeting in New York to hold the curtailment conference between the motor car manufacturers and George N. Peek, Frank B. Noyes and C. R. Replogle of the War Industries Board in Washington April 29. At this meeting further curtailment of the industry for 1918-19 will be discussed. All materials including lumber, leather, steel and coal, etc., will be taken into consideration. At the same time the Government officials will be urged to take heed of the large efficient factory organizations which will be disrupted if another serious cut in the curtailment of the industry is effected.



EDITORIAL PERSPECTIVES

365-Day Roads

THE meeting of the United States Chamber of Commerce in Chicago last week made more apparent than ever the truth that the 365-day road is the need of the country. That we are coming to that time, when the 365-day road shall be existent, is certain. But we must hasten its coming. The motor truck already is taking over the business of short hauling from the railroad in some parts of the country. It is necessary for it to do so. This cannot become universal, however, until 365-day roads become universal. Some of the states made this motor truck service possible this winter by constant, and concerted, action in keeping the roads clear. Incidentally they eliminated much of the disintegration roads usually undergo with the spring thaws. But this was peculiar to only a few of the forty-eight states.

THE chamber adopted resolutions calling for a permanent policy that would assure co-ordination of railroads, water routes and highways. It advocates the completion of trunk highways for heavy traffic immediately wherever such will relieve congestion of traffic. The whole country is crying out for some such measures. The railroads constantly are assuming new burdens of further war supplies. The motor truck is taking its share, but the motor truck cannot assume its full share without roads that are good and permanent every day in the year.

THE motor truck offers a transportation that the railroad cannot. For that reason it is even more desirable that the motor truck be made full use of. The motor truck takes the freight at the point of origin and delivers it at the door of the consignee. It provides its own terminal facilities. Hard-surfaced highways capable of carrying the increasing streams of motor trucks are a necessity. The sooner every community in the United States realizes this the better for transportation as a whole. The Government recognizes it. The Highways Transport Committee is doing everything in its power to make it possible to carry the new burden by motor truck which the railroads cannot carry. The return loads bureau is a recognition of the need of this great motor truck haulage. The rural express is another recognition. All these are of little avail, except in certain small localities insignificant in comparison to the great area of the United States, without 365-day roads.

TODAY 400,000 motor trucks are in service in this country. It is estimated that by the end of the war we will have 4,000,000 in service. It is not too early now to plan for a sound program of highway development after the war, but some action before the war ends is necessary if the motor vehicle is to be allowed to do its part. S. M. Williams, president of the Highway Industries Association, states that a recent canvass of the business men of the United States shows practically an unanimous belief that highway improvement is an economic and war necessity and that construction should proceed if the highways are to meet the traffic requirements. Highways already improved should be maintained by all means. Even if your community cannot build roads now those you have should be maintained. Highways in many localities are going to pieces on account of the tremendous increase in traffic. Many of the highways were not built to withstand present traffic demands. Those of the future must be built to withstand such demands. That is what is meant by 365-day roads.

The Internal Combustion Engine

THE internal combustion engine, whether burning gases, gasoline, kerosene or heavier fuels, rapidly is taking a place of relatively great importance in practically every department of industry and production, and, indeed, in some it is assuming commanding importance. Mere reference to the dominance of the internal combustion engine in the automotive industry will illustrate this fact. The rapid increase of the motor truck also and its employment for transportation purposes in rivalry with the railroads illustrates still another phase of internal combustion engine employment which has come about largely through conditions due to war. Lastly, the invasion of the fields of agriculture by the gas engine may be instanced, wherein it rapidly is becoming the dominant type of power-producing unit.

PERHAPS it is not saying too much to assert that of all the uses which have been found for the internal combustion engine, in war, navigation, aviation, transportation, industrial and in the arts, its employment agriculturally is destined to be the most important and far reaching in its effects. The possibilities are beyond the power of the imagination to conceive. Just begun as it has, already the internal combustion engine, largely through its application to farm tractors, is being relied upon in large measure to win the war which now is devastating so large a portion of the earth. Looking at it from every point of view it would appear that the gas engine is destined to be the most important factor both for destruction and construction the world possesses to-day.

The Gasoline Situation

MANY persons have interpreted the remarks of A. C. Bedford, chairman of the petroleum war service committee, in Chicago, as meaning a complete contradiction of his recent assertions in regard to the supply of gasoline available. Production of gasoline so far has been sufficient for all needs. The kernel of the matter seems to be that in case the demands for fuel oils become so great as to make unavailable the crude from which the gasoline is obtained, the supply of gasoline necessarily will be reduced, and, even if the demand does not become so great, the normal demands of the 5,000,000 passenger cars and trucks this year have grave significance.

WE are not in for a gasoline famine. Mr. Bedford intended to convey no such impression. But economy in the use of gasoline is necessary, just as in food and in fuel, though not yet to such an extent. The conservation may be no longer a matter of choice should the demands for fuel oil and gasoline for our allies and other war needs of our own require such steps. But there is no need for fear of immediate restriction. The more economic a motorist is in the use of gasoline, that much further off is that time when restriction will be necessary, for if every one of the 5,000,000 motorists saved a pint a day in 365 days it would amount to 431,250,000 gal., enough to run several cars several lifetimes.

Postal Rural Express

Postoffice to Inaugurate Two Parcel Post Routes by Motor Truck

Will Connect Washington with Virginia Farms

WASHINGTON, April 15—Special telegram—A most important experiment will be inaugurated by the postoffice beginning May 1, when two parcel post motor truck routes will be installed between Virginia and this city. The innovation of these routes will be closely watched by Washington officials, as they form the experimental basis for considerable enlargement of the plan with establishment of other routes in co-ordination with food administrators throughout the United States.

The two routes are expected to bring the Washington produce consumers in direct contact with Virginia farmers. One route will be from Washington to White's Ferry. The other from Washington to Middleburg, each including all the important centers and farms in the district. The trucks will leave Washington at 11 o'clock every morning, reach their destination at 2:30 in the afternoon of the same day and make the return trips leaving the Virginia terminals an hour after arrival. This will allow Washington householders to send orders to Virginia farmers by morning mail and receive the desired food fresh the evening of the same day.

C. R. Wilson, District of Columbia food administrator, is trying to devise some means of insuring the farmer prompt payment for his produce and insuring the consumers fresh produce. This may be accomplished by establishment of a reference bureau to serve as a clearing house for farmer and consumer.

MOTORS INAUGURATE BOULEVARD

Chicago, April 13—In the presence of a crowd which numbered thousands Mayor Thompson at 5 o'clock this afternoon inaugurated the widening of the Michigan Boulevard link by pulling a rope which toppled over the first wall to fall in the work. As the wall, which was part of a building now standing on the site of the link, fell, the event was greeted by the cheers of the crowd and by the tooting of the hundreds of horns on the motor cars which had gathered for the parade which followed.

The beginning of this important improvement came at the end of years of agitation and after the successful settlement of some 8500 private claims. What it will mean to Chicago the motorists of the city and the traffic police know best. Few short stretches of city street in the world have witnessed the daily congestion which was the condition from Michigan boulevard and Randolph street, across the Rush Street bridge and on the north side to the Alexandria hotel. The widening of Michigan boulevard will provide a straight link between the boulevard systems of the north and south sides of the city and will greatly facilitate motor traffic.

Following the ceremony of demolition a motor car parade participated in by hundreds of decorated cars covered the boulevard system of the city, terminating at the Eidelweiss Gardens for a dinner.

MORE WAR TRUCKS

Washington, April 15—Special telegram—Specifications are being drawn up and bids soon will be asked from motor truck makers for 15,000 class B heavy-duty standardized war trucks. These orders when placed will make a total of 25,000 B trucks, including the 10,000 already ordered and in production.

"ALL ROADS LEAD TO LIMA"

Lima, Ohio, April 13—The annual convention of the Ohio State Automobile Association to be held here May 3 will be a real motor meeting. Delegations will drive to the convention instead of using the railroads. The convention will be held a month later than has been customary to insure Ohio's roads being in such condition as to make touring practicable from all parts of the state. Routes have been laid out leading to Lima from all the forty-five cities in which clubs are located.

Another new feature of this year's convention is the abandonment of the old-style banquet in favor of a meeting of a more patriotic character. A simple dinner will be served by one of the patriotic societies of Lima.

To Levy 10 Per Cent

France Modifies Tax on Motor Cars to Include All Machines

Formerly Applied Only to Certain Types

PARIS, March 10—On a practically unanimous vote the French parliament has decided that the luxury tax should be levied at the rate of 10 per cent of the selling price of all passenger cars, chassis and bodies. This is a modification of the original law, which considered cars as luxuries only when they exceeded 12 hp. or when the selling price was more than $3,000. Trucks, public passenger cars, tractors, etc., are not taxed. The luxury tax is applied, however, to all motor boats and motor boat engines. Motorcycles, sidecars, cyclecars and similar vehicles have to pay 10 per cent luxury tax when the individual selling price is more than $400. Bicycles selling at more than $50 have to pay the 10 per cent tax.

Objection has been raised against the inclusion of motor cars in the luxury list while pianos and many classes of costly furniture are excluded. So little attention was paid to the car manufacturers' protest, however, that instead of withdrawing the tax the government applied it to all passenger-carrying vehicles. For the time being no income will be obtained from the tax so far as motor cars are concerned, for there is not a manufacturer in France with a car for sale, and the few dealers with machines in stock are unable to find clients for them owing to withdrawal of all supplies of gasoline for civilian uses.

STRINGER TO BUILD SPORT CAR

Cleveland, Ohio, April 13—Mel Stringer, builder of the M. E. L. special, a speed car, will make a sport-type car for those wishing a car that will do 90 m.p.h. or better. In addition to building a stock speed car he will build racing cars to order also. Deliveries on the new car will start in about thirty days. Two, special jobs, were delivered to owners last month.

Part of the motor car parade that celebrated the begin ning of operations to widen Michigan Boulevard link

Pneumatics on Truck

Goodyear Experience Shows Difference in Use as Compared to Solids

Changes in Design That May Be Made Later

AKRON, Ohio, April 12—To those who plan to equip their vehicles with pneumatic tires for the gerater speeds which they make possible the experience of Goodyear in opearting its fleet of seven trucks with giant pneumatic tires is of special interest. As pointed out previously the engine of the ordinary 5-ton truck is not large enough for the greater speeds made possible by the use of pneumatic tires. While the six Goodyear trucks which are equipped with their ordinary engines have averaged 10 m.p.h. running time for the entire 740-mile route between Akron and Goodyear, Conn., the 3-ton Packard equipped with a 5-ton engine has averaged 14.9 m.p.h., actual running time, on the route. The total elapsed time of the trip on which this speed was maintained was 77 hrs., which gives an average speed of 9.6 m.p.h.

On the 3-tonner equipped with the 5-ton engine, the gasoline consumption was 5 m.p.h. over a period of three complete trips to Detroit and two to Boston, giving a total mileage of 1990. The ordinary 5-ton Whites and Packards used in the service averaged 3½ m.p.g. The 3-ton White has averaged 4 m.p.g. and the 3½-ton Mack 3 m.p.g.

Oil Consumption

In oil consumption, the 3-ton truck with the 5-ton engine is also considerably ahead of the other trucks, averaging so far about 110 m.p.g., whereas all of the other trucks have so far averaged only 50 m.p.g. This especially low lubricating oil record is partially explained by the fact that the engines are running at higher than their rated speeds and in addition are sometimes run without a single stop for six continuous days. The engines on the 5-ton standard Parkard and the 3-tonner with the 5-ton engine are rated to run at 1000 r.p.m. but in the Goodyear trucks are run at 1500 r.p.m. The special fire department engine mounted in the 3½-ton Mack is rated to run at 1100 r.p.m. but is actually run at 800 r.p.m. In considering these oil and gasoline records, it must be remembered that the trucks have to cross the Allegheny mountains where the grades are as high as 18 per cent for a climb of 100 ft. on the west side of Ligonier mountain.

The operation of the 3-ton Packard with the 5-ton engine also bears promise of resulting in considerable advancement in chassis design to the end of reducing the chassis weight on account of the use of penumatic instead of solid tires. The 3-ton Packard with 5-ton engine and carrying a full 5-ton load already weighs 4000 lb. less than the standard 5-ton Packard with a 10,000-lb. load. The 5-ton Packard loaded with 10,000 lb. weighs 23,000 lb., including a 3500 lb. body. The 3-tonner with a 5-ton engine and a body of the same weight weighs only 19,000 lb., thus showing a clear saving of 4000 lb.

While the present body on the 3-tonner with a 5-ton engine weighs 3500 lb., the next body of the same type to be used will weigh only 2500 lb. and it is expected on the authority of the chief engineer of the Packard company that 800 lb. can be saved on the chassis on account of the use of penumatic tires. This will thus give a clear saving on the completed vehicle of 800 lb., 800 lb. on the chassis and 1000 lb., or from 3500 lb. to 2500 lb. on the body. The reduction in body weight will be secured by reducing the size of the sills and fitting a lighter slat roof instead of a solid one. Because no hand trucks are run into the truck body, the flooring can be reduced from 1¼ in. stock to ⅞ in. stock. During summer running the weight of the body can be reduced an additional 150 lb. by removing all the glass in the doors and sides.

A 44 by 10-in. pneumatic tire weighs about 150 lb. and the rim another 25 lb. or a total of 175 lb. The weight of such a tire when carried on the rear of the tailgate does not place a burden on the driver in opening and closing the tailgate because this is only done twice on every trip of four to six days.

GEORGIA TO DEMONSTRATE

Atlanta, Ga., April 13—A series of tractor demonstrations, the first of which will be held here May 7 and 8, has been arranged for by the State Council of Defense of Georgia. It is planned to give a demonstration in each of the congressional districts of the state. Each demonstration will continue for two days, the first day being devoted to plowing with a demonstration of night work with searchlights and the second day to the final preparation of the seed bed.

FARMER TO REPAIR MOTORS

Des Moines, Iowa, April 13—What is probably the first farm repair shop for commercial business ever opened in Iowa will be opened soon by Gordon Dana at his farm 7 miles north of Perry, Iowa. Complete equipment for repairing all kinds of motor cars and tractors, including an oxy-acetyline welding and carbon-burning plant, has been ordered, and a vulcanizing plant also will be part of the equipment. A complete stock of parts and a small line of accessories will be carried.

WEIDELY AND CLEVELAND CLOSE

Cleveland, Ohio, April 12—George Weidely, vice-president of the Weidely Motors Co., Indianapolis, Ind., has become associate engineer for the Cleveland Tractor Co., thereby establishing a closed relationship between the two companies. The tractor company, on its part, has sent A. F. Knoblock, its general manager, to the Weidely plant as general manager. Each executive spends two days a week in the other company. W. H. Knoblock, a brother of A. F. Knoblock, has been made production manager for the Weidely company. As it is well known in the trade, the Weidely company has a large contract with the tractor company for engines, and by exchanging two of their exceutives in this fashion the two companies are able to bring their efforts into closer harmony.

More Gasoline to Allies

United States Ships 17,676,884 Gal. in Month to Foreign Countries

Exports Gradually Shifting from Neutral Lands

WASHINGTON, April 12—Export of gasoline from the United States totaled 17,676,884 gal. during January of this year. The greater part was shipped to the United Kingdom. France was the second largest purchaser, and Italy came third. The value of the month's shipment is $4,335,637.

Gradual shifting of gasoline exports from neutral countries to the allies is taking place. In December, 1917, Brazil received 878,058 bbl., but got none during January. Uruguay, Venezuela and the Philippines likewise received no gasoline from the United States during January.

Tables showing gasoline exports for January, 1918, and for the seven months ending January, 1918, follow:

	JANUARY, 1918 GALLONS	VALUE
France	6,134,090	$ 1,305,080
Italy	1,080,968	375,987
United Kingdom	6,222,681	1,507,324
Canada	652,134	119,005
Panama	205,210	64,949
Mexico	35,783	8,458
Cuba	238,629	72,741
Argentina	712,040	231,769
Brazil	.....	.....
Uruguay	.....	.....
Venezuela	.....	.....
Australia	672,000	185,710
New Zealand	350,400	102,473
Philippine Islands	.....	.....
British So. Africa	50,000	17,700
Other countries	1,322,949	344,441
Totals	17,676,884	$ 4,335,637
Seven months ended January, 1918:		
France	24,094,450	$ 5,428,390
Italy	18,561,624	4,700,864
United Kingdom	36,885,187	8,077,202
Canada	15,108,919	2,732,492
Panama	697,070	194,067
Mexico	687,651	191,029
Cuba	2,520,976	645,001
Argentina	2,121,586	492,939
Brazil	4,073,913	1,045,196
Uruguay	400,020	64,007
Venezuela	188,770	62,038
Australia	5,396,245	1,321,457
New Zealand	3,160,831	852,569
Philippine Islands	1,139,504	281,762
British So. Africa	2,009,490	602,734
Other countries	7,927,369	2,096,048
Totals	124,973,605	$28,787,795

DENBY TRUCKS COST MORE

Detroit, April 12—Denby Motor Truck Co. will increase the prices of its product April 15. The new and old prices follow:

	NEW PRICE	OLD PRICE
1-ton	$1,650	$1,490
2-ton	2,350	2,025
3-ton	2,775	2,525
5-ton	4,900	4,900

COLUMBUS ORGANIZATION

Columbus, Ohio, April 12—The Columbus Tractor Co. has been incorporated with an authorized capital of $1,000,000 to manufacture farm tractors on a large scale. The concern is a reorganization of the McIntyre Mfg. Co., which has been in operation for several years and which has been manufacturing a tractor called the Farmer Boy.

The company recently completed the first units of a large plant on Goodale street, where a tract containing 10 acres has been

acquired. This tract has railroad facilities and the present plant has a floor space of 40,000 sq. ft. It is the intention of the new company to erect new buildings as rapidly as the need arises. The company has orders on its books to keep the present plant busy for several months and has been unable to accept an order for shipment to France. Foster Copeland will be president and Marion McIntyre will be general manager.

The company now is making ten complete tractors daily and this will be increased gradually to make the total 7500 in 1919. It is a three-wheeled tractor, equipped with a Waukesha engine, 3¾ by 5½ in. and developing 25 hp.

HARTFORD HOLDS ELEVENTH

Hartford, Conn., April 12—Thirty-nine makes of cars were displayed at the eleventh annual show of the Hartford Automobile Dealers' Association, Inc., which ended tonight. The show was under the auspices of the Home Guard and generally accepted as the best ever given by the Hartford dealers' association. There were thirty-one exhibitors of passenger cars. Twenty-one makes of trucks were exhibited, while three tractors and one trailer were shown. It was the first year for tractors. Attendance during the week is estimated between 25,000 and 30,000. This is about the same as last year, it was said.

DES MOINES ACTIVE

Des Moines, Iowa, April 13—Des Moines motor car dealers, garages and allied trades this week bought $237,950 worth of Liberty bonds. The Des Moines bond sale campaign is officially closed, but several of the team workers will carry on their work for several days yet. The total subscriptions for Des Moines during the week amounted to $7,353,850. This is approximately $1,000,000 over the Des Moines quota. There were 488 subscriptions from the motor trades and as there are no factories here Des Moines motor men feel that this is a good showing.

DENVER APPOINTS COMMITTEE

Denver, Col., April 12—The third Liberty Loan campaign is being aided substantially here by the Denver Automobile Trades Association's Liberty Bond committee of twelve members. President Fred L. Green is chairman of the committee, which is working as one of the many teams under direction of the central committee in charge of the Denver campaign. The trades committee includes members of the Denver Motor Club and the Rocky Mountain Auto Trades Association. They are distributed among several teams.

TRUCKS AND TRAILERS OVERLAND

Detroit, April 12—The Walter Motor Truck Co. of New York and Troy Trailer Co. of Troy, Ohio, conducted an unusual test recently when they brought into Detroit from Toledo 12 tons of springs from the Mather Spring Co. of Toledo for the Ford Motor Co. The tractor-truck used in this demonstration was a 2-ton Walter which weighs 4 tons. The truck is of four-wheel-drive construction and is equipped with a power winch. One 5-ton and one 3-ton Troy trailer were in tow. The time consumed in making the trip was 8½ hr.; 3 qt. oil and 22 gal. of gas were used.

Start of Co-operation

With Washington Representatives, Says Peek, Who Sees No "Non-essential"

Conservation of Fuel and Food Discussed

CHICAGO, April 12—That co-operation between the Government and the industries should start from the Washington representatives of the Chamber of Commerce of the United States was brought by George N. Peek, chief of the procurement bureau of the Council of National Defense, before the war convention of secretaries here to-day. In regard to "essential" and "non-essential" industries Mr. Peek said that as far as labor and capital are concerned there is no such thing as a "non-essential" industry, though a distinction must be made between war industry and non-war industry.

Waddill Catchings, chairman of the war service committee of the National Chamber of Commerce, spoke briefly at the same meeting and said, among other things, that on business men depends the actual carrying out of the principles determined at the meetings here.

Ernest Smith of Indianapolis introduced the subject of Local Industries and War Work in the afternoon. Mr. Smith said industry west of the Mississippi river was suffering from difficulty in procuring materials and because the war work in the East was taking labor. The difficulty of holding labor in the West was due very largely to the fact that western industrial concerns had not been getting their due share of war orders. Speaking of the efficiency of Washington representatives of local business organizations, Mr. Smith said that there was no place for such representation in Washington, but that state organizations might very advantageously maintain an office.

Mr. Smith enumerated some of the difficulties in getting war orders for the local industries. First, he said that too many manufacturers have a normal fear of the Government contracts because of the specifications, inspections, requirements and other red tape incident to such orders. The second difficulty encountered was the general impression in the East that the West grew nothing but gray iron castings, pigs and politicians. As long as this impression prevailed it was difficult for the western manufacturer to secure his share of business, because not enough was known about his facilities. Another difficulty was that of taking care of small manufacturers in the little town. The latter had to be convinced that he had neither the capital nor the equipment to take major Government contracts and that he should be satisfied to get his business through sub-contracts. In getting small manufacturers to take the proper perspective on this had been one of the hardest tasks his bureau had had to meet.

On "Financial Campaigns and War Chests" Raymond B. Gibbs, Lockport, New York, said that war chest meant the putting into one big campaign of solicitation the providing of funds for all movements, such as the Red Cross, Y. M. C. A., etc. It practically meant adopting the budget plan and the laying down of a definite schedule of giving.

The growth of the idea of a war chest had been a process of evolution in the community mind. It was new and had to be sold to every community. How it had worked out in the practice was told by the secretaries who had had charge of war chests in the various cities of the country.

"Conservation of Fuel and Food" was opened by John Wood, Roanoke, Va. Mr. Wood opened the matter by asserting that there had not been the sympathetic response from the people outside of the thickly settled section of the country in the conservation of food particularly, which the Government had a right to expect. He felt convinced from his own experience that the failure to conserve in many localities had been due to the inability of local business men to get accurate information as to just what to do. People on the whole were willing but they did not know. He asked voluntary experiences from secretaries who had had practical experience in bringing about effective conservation in their respective communities. The secretary from Akron, Ohio, said that the matter had been handled through the Chamber of Commerce of Akron, giving publicity to all of the rules, regulations and requests which came from Washington and Columbus.

What Has Been Done

At York, Pa., 125 of the leading business men of the Commercial Club had visited the public schools giving 10-min. talks and thus had reached the homes through the children.

In Quincy, Ill., use was made of the retail grocers' associations to reach the consumers. The retail grocers, retail meat dealers, milk dealers, restaurants, hotels, wholesale produce dealers, and a home club of 1000 women had been organized to make effective the suggestions of the food commission. The secretary said that on a conservative estimate the city had saved since last October to date over $727,000.

At Council Bluffs an endeavor had been made to make the Chamber of Commerce the pivotal organization of the city and reach the subsidiary organizations through it. The plan of lectures in the schools, etc., had been employed.

At Minneapolis a food guard of several hundred men had been formed, which inspected all public eating places on wheatless and meatless days. The first violation of the regulations brought a reprimand and on a second offense, supplies of flour, sugar and other essentials were cut off.

The question of fuel conservation was discussed briefly by the coal administrator of the state of Washington, who was returning from a conference of similar officers held recently at Washington. He said that the fuel crisis had by no means passed. At the present time many sections of the country are getting a day-to-day service. Again the crux of the situation was transportation. The speaker intimated that radical steps to meet the situation were under consideration.

Would Correlate Transportation

United States Chamber of Commerce Goes on Record as Favoring Adoption of Permanent Policy to Assure Co-ordination of Railroads, Waterways and Roads

CHICAGO, April 12—The business men of America went on record yesterday as favoring the adoption of a permanent policy assuring co-ordination of railroads, water routes and highways. They also went on record that trunk highways for heavy traffic be completed immediately where they can be useful for relieving congestion.

This resolution, which is reproduced on these pages was the outcome of a day's discussion of the railroad and highways transportation situation by the United States Chamber of Commerce at its sixth annual meeting, whose four-day session ended here to-day. Representing as it does the organized business interests of this country, the findings of the United States Chamber of Commerce carry utmost weight.

Two Sections

Yesterday's session on the transportation situation was divided into two sections: One of them was devoted chiefly to the railroad situation and under the leadership of Harry A. Wheeler, chairman of the committee on railroads of the Chamber of Commerce. It consisted of papers by Alba G. Johnson, president of the Baldwin Locomotive Works, on "Motive Power"; John F. Wallace, chairman of the Chicago Railway Terminal Commission, on "Terminals"; and by Samuel O. Dunn, editor *Railway Age*, on "Car Supply," as well as a talk entitled "Extensions" by Francis H. Sisson, vice-president of the Guaranty Trust Co., New York. It was as a result of the discussion of these, and particularly Mr. Sisson's paper, showing the need of greater inter-relation between our three main transport facilities, the railroad, the waterways and the highways, that the resolution on that subject was made.

Highway transportation, in itself, had a special session under the leadership of F. A. Seiberling, president of the Goodyear Tire & Rubber Co., and president of the Lincoln Highway Association. The meeting was addressed by Roy D. Chapin, chairman of the Highways Transport Committee, Council of National Defense; A. C. Bedford, president of the Standard Oil Co. of New Jersey and chairman of the Petroleum War Service committee, and Secretary H. G. Shirley of the Highways Industries Association, formerly state highway engineer of Maryland.

Perhaps the biggest outcome of the meeting, outside of the resoltuion, was the suggestion by A. C. Bedford that while the production of gasoline so far has been sufficient for all needs that it might be possible, through Government action, to limit the supply of motor fuels for passenger car use. He did not say that in so many words, but his attitude seems to have changed somewhat from that of a few weeks ago, when he publicly announced that there was no prospect of any necessity of limiting the supply of motor fuel. His statement yesterday was couched in these terms.

"I am hopeful that there will be sufficient gasoline available to provide for all commercial as well as passenger vehicles in operation during 1918. *Even should there be a shortage of gasoline, the development of the auto truck should not be retarded, even though it should become necessary to place restrictions on the use of gasoline by passenger vehicles for pleasure purposes.*

"I must again earnestly urge upon every consumer of gasoline the imperative necessity of conservation. When in July of last year I issued a statement upon behalf of the Council of National Defense, I said, 'People should look upon their automobiles as necessities to be used only when needed. Not a gallon of gasoline should be used in the present emergency except for some useful thing.'

"Gentlemen, the warning is more than ever necessary. The conservation of gasoline may no longer be a matter of choice. It may become necessary to set down definite and drastic regulations to restrict needless consumption of such essential products."

In opening the meeting on highway transportation, Chairman Seiberling recalled that for several years the tonnage carried over our railroads had doubled each decade, while the additional mileage had decreased to only 76 miles per year.

Recently, a new piece of transportation machinery has been introduced and the motor truck sounds the death knell of short-line railroads, because it provides its own terminal facilities, a feature which J. J. Hill said was the greatest need of the railroad. The motor truck takes the freight at the point of origin and delivers it at the door of the consignee. Hard-surfaced highways capable of carrying the new burden by motor trucks, which the railways cannot handle, are a necessity. Of our 2,500,000 miles of highways, only 10 per cent have been improved, and not all of that improved is capable of carrying truck chassis all the year round. We are coming to a period of highways with permanent surface, wider track and open to traffic 365 days in the year.

There are 400,000 motor trucks in service in the country today. By the end of the war we will have 4,000,000 in service. The postal department shows a deficit of $3,000,000 in its parcel port. Through the rapid introduction of motor post, this deficit will be converted into a profit, when well-surfaced highways have been extended. In good time our great task on the other side will be completed, and we must think of activity after the war, and plan for a sound, safe program of highway development.

Roy D. Chapin, in his talk, told of the Government recognition of the fact that the highways must play their part through the establishment of the Highways Transport Committee of the Council of National Defense, outlined the systems of inter-city motor transports in this country and in England and of its rapid recent development, of the return loads bureau of the methods of handling freight terminal congestion by motor truck, etc. His talk is reproduced herewith.

How Baltimore Manages

Mr. Shirley explained how Baltimore, through its organization of business men has overcome the terminal freight congestion in that city, by using the motor truck for a short haul, by unloading the cars in the yards into trucks instead of at the terminals, etc.

A consideration of highways and railroad transportation is only one of several different angles taken up by the United States Chamber of Commerce in the convention. The shipbuilding situation occupied a great deal of thought of the business men. Likewise did the consideration of the relation between industries and war work. Finance during war times was given much discussion. Trade acceptances were the subject of a whole day's consideration by one section of the meeting. The convention was addressed by such men as Secretary of the Interior Lane, Secretary of the Navy Daniels, Charles A. Hinch, president of the American Bankers' association, and others.

Can the Petroleum Industry Keep Pace?

By A. C. Bedford

Chairman Petroleum War Service Committee

THE question I am called upon to discuss this afternoon, as I understand it, is: "Can the petroleum industry keep pace with the development of motor truck transportation?" I answer: "It can, and it will, because it must."

It was inevitable that motor trucks should become an increasingly important factor in our transportation systems. An instance of this was the successful operation in such a winter as last of a motor truck express route between New York and Philadelphia. Since then the service has been extended to Baltimore, Washington, Boston and other points. When the Government sent 30,000 transport trucks, ordered for shipment abroad, to points of embarkation under their own power, instead of by rail, it relieved about 15,000 freight cars, of a capacity of about 800,000 tons, and also permitted the transportation of 90,000 tons of material to the coast in these trucks, making the total release of freight cars 17,250, of 40 tons capacity each.

The possibilities opened up by these transportation ventures emphasizes that we must avail ourselves to the fullest extent of the service of the motor truck, and I am hopeful that there will be sufficient gasoline available

to provide for all the commercial as well as passenger vehicles in operation during 1918. Even should there be a shortage of gasoline, the development of the motor truck should not be retarded, although it should become necessary to place restrictions on the use of gasoline by passenger vehicles for pleasure uses.

While my mission is to tell you that the petroleum industry will meet this new demand upon it for gasoline for long haul transportation by motor trucks, I must again earnestly urge upon every consumer of gasoline the imperative necessity of conservation. When in July of last year I issued a statement upon behalf of the Council of National Defense, I said, "People should look upon their motor cars as necessities, to be used only when needed. Not a gallon of gasoline should be used in the present emergency except for some useful end."

Warning More Necessary

The warning is more than ever necessary now. The conservation of gasoline may no longer be a matter of choice. It may become necessary to set down definite and drastic regulations to restrict needless consumption of such essential products, and in the meantime is there any more easy, simple and effective expression of our patriotism than to refrain from thoughtlessly and selfishly using what the Government and our allies need?

Here are the salient facts. At the beginning of 1916 there were about 2,400,000 cars and trucks in the United States. At the beginning of 1917 that number increased to over 3,500,000. The total motor car and truck registration in the country as of Jan. 1, 1918, according to official figures furnished from all of the forty-eight states, is 4,941,276. This figure does not include duplicate registrations and, of course, does not include hundreds, and perhaps some thousands, of cars in remote districts, all of which are not registered. In round figures, there must have been close to 5,000,000 motor cars and trucks in the country on Jan. 1 of this year.

Before considering what this means to the petroleum industry, we may analyze the truck and pleasure car situation a little further. It is unfortunate that many of the states in their official returns do not distinguish between passenger cars and commercial cars, so that absolutely dependable statistics are not available. But for our purposes, the rough estimate prevailing in the motor truck industry may be accepted as sufficiently accurate, and these figures place the number of trucks in operation in this country at the beginning of this year at 351,000. A comparison of this figure with the total of 5,000,000 cars at once suggests the wide possibilities for the development of motor trucks, and the industry would appear to be in excellent shape to take care of such a development. There are 378 commercial vehicle plants in this country, as against 195 motor car factories. But we can look forward to a development of the motor truck industry, and current estimates of motor truck output today run as high as 22,000 per month.

Estimate of Need

It is when we turn to the part that petroleum must play that the figures assume grave significance. Roughly, 5,000,000 motor vehicles in the United States will require about 50,000,000 bbl. of gasoline this year. Gasoline exports to the allies last year totaled nearly 8,000,000 bbl. They will be more this year. So that the total demand made on the petroleum industry for gasoline this year will be over 60,000,000 bbl. In 1917 our production was from 50,000,000 to 55,000,000 bbl.

In view of the increased demand, what are the conditions in regard to the production of crude? Here, again, the general facts, on the face of them, are not encouraging.

In 1917 our consumption was in excess of our production and importations of crude oil from Mexico, and it is fair to assume an increased consumption in 1918. Our production does not at present measure up very well to these anticipated demands, and furthermore, it is probable, owing to lack of shipping facilities, our importations from Mexico this year will decrease.

On the other hand, there are factors which tend to make the situation more encouraging. Apart from the possibility of relief in shipping conditions, and no more oil from Mexico, we can hope for improved conditions in our own production. Most of last year and early this year drilling operations were largely curtailed by the virtual impossibility of getting drilling tools and casing materials. Even prospecting was restrained somewhat by the uncertainties surrounding the future of the oil industry.

Many of these uncertainties have now been cleared away, thanks to the frank and liberal spirit in which M. L. Requa, representing the oil division of the Fuel Administration, has dealt with the industry. Realizing the situation, oil operators everywhere are keen to develop production with all possible dispatch.

There is naturally a large element of speculation in the testing operations and the wildcatting being carried on, but it is hoped the opening of new sources will be an effective check upon the declining output of the older districts.

There is, above all, the broad general fact that there are millions of acres of prospective oil territory, and the possibilities of future development in still practically virgin territory are encouraging. For the immediate present another encouraging feature is the improved processes of manufacture, by which larger quantities of gasoline can be produced from the crude, which heretofore was sold as fuel or gas oil.

Industry Is Co-operating

And in connection with this general question of production and refining, I would like to repeat what I have been often glad to say, that the petroleum industry is co-operating unreservedly with the Government. The oil men have organized so as to render the most efficient service, first, in supplying the full needs of the Government and our allies, and, secondly, in taking care of the ordinary business needs of the country along the lines of priority, as laid down by the Fuel Administration. We are glad to have this help from the Government because the problem is one that bristles with difficulties. It is impossible to take oil for any one specific purpose without exerting a detrimental influence on some other branch of industry. The question of what is least essential is an extremely difficult one to determine and we are faced with a problem which Mr. Requa himself defined pretty clearly when he said the other day that he was "somewhat of the opinion that the non-essential industry does not exist."

Thus the development of motor transportation comes in as one aspect of a many-sided problem in which the fuel oil requirements for our own and the allies' naval and merchant marine furnish another complication.

I mention fuel oil here because it may have an important bearing on gasoline supplies, in that much gasoline is obtained from what would otherwise be fuel oil. If, however, fuel oil itself is in urgent demand, it naturally ceases to be available as a source of gasoline supply, and it is even possible that the fuel oil demand might be so urgent that crude, which is at present run for gasoline, might have to be run for fuel oil, thus still further limiting the source of gasoline supply.

In the main, however, though I have told you frankly and in detail of the difficulties with which the petroleum industry is faced, I still remain firm in my belief that these difficulties will be overcome and that all the really important gasoline requirements of the country at large will be provided for amply. If it should become necessary to ask owners of cars to restrict the use of their motor cars for purposes of pleasure, I feel sure the motorists of the country will make this limited sacrifice of their amusements willingly and gladly.

Problem of Roads

There remains another problem in connection with the further development of motor truck transportation, and that is the problem of the roads. Existing good roads are deteriorating rapidly, for various reasons, and we all know that when deterioration sets in it is exceedingly rapid unless the roads are currently maintained. Thus the maintenance of existing highways will require large quantities of asphalt or heavy binders, and more good roads are desired and required if truck transportation is to develop its full efficiency.

The truth, and the trouble, is we have not right now the material necessary for this road construction and road maintenance. Speaking in very round figures, about 1,000,000 tons of asphalts of various kinds are required each year for road work in the United States, and almost half this amount is required for repairs and maintenance alone. But all our asphalt has to be imported with the exception of a comparatively small proportion obtained from California and some Texas crudes, from coal tar, and as by-products from cracking processes, and at this time practically none is being imported, either from Mexico, the big source of asphalt base

The Chamber's Resolution

WHEREAS, It is apparent that the present traffic burden is beyond the capacity of the railroads and that the vigorous and successful prosecution of the war is hampered thereby; that it is therefore imperative that our great rivers, canals and intercoastal water routes, as well as our main highways, should be fourthwith used to move freight;

BE IT FURTHER RESOLVED, by the Chamber of Commerce of the United States that the Government, through the President and the Director General of Railroads, be petitioned:

1—To organize and operate existing equipment and construct new equipment for use upon the inland and coastwise waterways in accordance with the authority recently conferred by Congress in the Transportation Bill.

2—To complete trunk highways for heavy traffic where they can be useful in relieving railroad congestion.

3—To adopt a permanent policy, assuring co-ordination of railroads, water routes and highways for traffic service.

The steam and electric railways are inadequate for our transportation needs. The Motor Car fills the gap.

crude, or from Bermuda and Trinidad, the main sources of natural asphalt.

So far as manufacturing capacity is concerned, we have ample enough to turn out sufficient asphalt to permit of the construction of several thousands of miles of roads.

There is the additional difficulty of labor for construction and maintenance work on the scale we would like to see. From the viewpoint of the motor truck alone it would require a large number of men, who probably at this time can be used to better advantage in agricultural, shipbuilding and other industrial work.

There is also to be considered the large number of men required to operate motor trucks, as compared with the number in a train crew. Five men on a train crew average 2000 tons and haul about 100 miles a day of 24 hr. One man on a truck hauls 5 tons about the same distance in the same time, or 400 tons to a man against 5 tons to a man.

My feeling, then, as regards the road end of the problem is that the auto truck transportation plan, especially in its relation to the prosecution of the war, is so important that it should be put into effect to the fullest extent possible, making the most possible use of existing roads, even though no new good roads can be built, and, with respect to the demand for gasoline for essential purposes, I can only repeat what I said at the outset: It can and shall be met. But let me again repeat, because I feel very deeply the seriousness of it, every consumer of gasoline must endeavor to purge himself of his share of reproach because of any unnecessary use or waste of gasoline, remembering there is still great demand for our own and our allies' war needs.

New Conditions in Transportation

By Roy D. Chapin

Chairman Highways Transport Committee

IN the past six months there has come to our view an entirely new picture in transportation in America. We are standing at the threshold of wonderful new developments. We have seen the railroads taken over by the United States government, and, simultaneously, we have seen the highways of the country taken over by the people of this country to haul goods which could not be hauled during this period of railroad congestion by the railroads themselves.

In the whole history of transportation, highway transportation has been the patient drudge. Suddenly the motor truck has come forward and has supplied for the highways what the steam engines supply for the railroads and the electric car supplied for the interurban systems—rapid transit. This has brought about, as you realize, many, many new conditions.

The conditions which I shall hope to discuss in my paper are not only conditions as pertaining to the roadbed itself but as pertaining to the development of types of traffic which we, I think, have not yet seen or pictured in our imagination.

Highways Must Act

Governmental recognition has been given to this fact, the fact that the highways must play their part, especially in this war condition, and it finally resulted in the employment of the Highways Transport Committee of the Council of National Defense. This committee, of which I happen to have the honor to be chairman, is the first committee or organization of any authority under the Government which has ever paid any attention to highways traffic. Our committee has been busy trying to keep abreast with the times, with these rapid new things that have come to pass within the last six months, due to the utter necessity of war transportation needs. We have formulated many policies, taking as best we may the previous experience that has been had in this country in highway transportation, and taking also what our good allies have had in the way of experience in England.

In England I might say that highway transportation has reached the high point in its development. It has had to. Every item of transportation in England must be used to the utmost limit. Today it is almost a misdemeanor, for instance, in England, to run a motor truck empty. Every effort is made over there to conserve and render efficient to the maximum every type of transportation throughout the British Isles.

I might say that this culminated this past winter in the appointment by the British government of a road transport board. This board has more power than our committee has. Our committee is advisory in its capacity. The road transport board of England was born of necessity. We have more transportation here than they have in Great Britain. That is what they must do, they must conserve, they must conserve on every single item in every phase of transportation. It has the power to control in itself the highway machinery in the way of vehicles, motor cars, horse drawn wagons. They are registering in England today every vehicle on the highways of the community and any time they are needed they will have the power to direct those vehicles. It is not my thought from what I have seen of our situation that that condition can ever obtain in America.

We have highway traffic developed to a great extent. We have highway traffic coming fast now. No limitation has been placed, I am glad to say, on the use of gasoline for highway vehicles, but we are leaving the stage in this country when you and I and possibly all the rest of us have in the past rather looked on the roads of this country as for the use of pleasure cars, as some of you like to call them, and passenger cars as the rest of us like to call them. The carrying of passengers, due to the great growth in the motor car industry, has developed to the point where millions and millions of people are riding daily over the roads of this country, but suddenly we come to a new picture where the traffic of the country, the freight that must travel and the express that must travel are now seeking the highways as an additional opening due to the fact, partly, that the railroads are congested; and due also to the fact that the time was just right, the dawn is just breaking on highway transportation. What the years to come will show no one can predict. I am going to outline to you as well as I can what we see in Washington today in the way of possibilities, new possibilities in the highway transportation field.

I venture to say at the present time almost 100 per cent of all commodities moved in this country traveled at some stage in that movement over the highways. I think there is no doubt but what the highways of our country carry more, carry a great deal more tonnage in a year's time than do the railroads. As you know, there are few new improvements in horse-drawn transportation. The theory of to-day as compared with fifty years ago, the efficiency is but a little higher if any. The great increase in efficiency, therefore, must come from the motor transport, and that being so our committee has directed its efforts to the study of the possibility of motor transportation, and that is for this reason that the motor transport fills a niche that is not filled by any other means of haulage. It takes the goods from the door of the shipper to the door of the consignee without any change or any rehandling in that process. Its development has come now to a point so in the last two weeks the Council of National Defense has recognized the utility and the necessity of motor transportation and has passed the following resolution.

Council Approves Trucking

"The Council of National Defense approves the widest possible use as a transportation agency of the motor truck, and requests the State Council of Defense and other state authorities to take all necessary steps to facilitate such means of transportation and removing any regulations that tend to restrict or discourage such use."

That is putting the stamp of Governmental approval on the new means of transport, which means so much to you and to me, in that it will supply to the country that thing it could not have either from the railroads or from the interurban lines or from the waterways in quite the same measure, transportation from door to door.

We have been in close touch with the railroad Administration, and we have had their most complete sympathy, and the suggestion from them that anything we can do as a committee which will take off of the railroads the short movement, which is congesting their terminals, and place that movement on the highways, where I might say it legitimately belongs from every economical standpoint, would be helping them just that much in this present serious situation.

One of the most prominent railroad men in the country—in fact Mr. Daniel Willard, who, you know, is not only chairman of the advisory commission of the Council of National Defense but also chairman of the Railroad Committee on Transportation of the Council, made a statement to me when I first came to Washington that there was no serious problem moving on the main line, the terminal was always the neck of the bottle. So we were working at the neck of the bottle to see what we can do in our way to help take out a certain portion of that traffic.

In that connection I want to outline something that Mr. Willard told me, shortly after our committee was first appointed. He said, "I see a new ideal in transportation which I could not see before I came to Washington. I see transportation in the future, that is, traffic given to that means of transportation which can best and most economically and most quickly carry that traffic."

And therefore, Mr. Willard says, "I recognize the utility of the motor truck in its particular field, and it can carry a portion of that traffic. Go ahead and see what you can do to put that traffic on the highways that legitimately belongs on the highways."

Inter-City Trucks

To-day most of our larger cities, especially I think in the eastern zone where traffic congestion is the worst, have established intercity truck lines, plying back and forth on a regular schedule, carrying goods out at a more rapid rate than either the railroads or express lines, and in many instances taking them right from your door and delivering them to the door of your consignee. These motor truck lines will soon form a perfect net work throughout our whole United States, and they will live not because they are well financed, not because they are run by an enthusiast, they will simply live on a competitive basis where they can prove that they will carry that traffic more quickly, more expeditiously and more safely than any other means of transportation.

That is the future of the inter-city truck

line. We come now to taking up something that England discovered before we did. Because England had to discover it. They found out over there—and I am citing in particular Manchester, England, as the first city to discover that—they found out that many motor trucks were coming in from outside, small manufacturing centers, and bringing in a load of goods to Manchester. Those trucks were unloading and turning about and going back to their point of origin empty. They found out that people from those same points were sending in to Manchester for goods that might be coming to them, that they were sending in empty trucks, and their trucks were coming back loaded. What do you think? You have sheer waste of transportation one way on both of those trucks, where one truck could have done the work. This resulted over there in the establishment of what they term return loads bureau.

England an Example

We went into this thing last fall and found that the Connecticut Council of Defense, because of their very serious congestion, being tied up as they never had been before, were considering this same proposition. We took all of the idea and experience that we get from England to them, and they took our idea, and they established throughout the entire state of Connecticut fourteen return loads bureaus, all listed in the telephone books as return loads bureaus.

What happens? Suppose you are going, or as a manufacturer, you are sending your motor truck, from Hartford to Waterbury. You want to ship a load up there to some man you are doing business with in Waterbury. That motor truck, of course, must come back, and you had no load for it, and it does not pay you to ship a truck up to Waterbury and have it come back unloaded. You go to Waterbury, your truck arrives there, and your driver calls up the Waterbury return loads bureau and says "Have you a load back for Hartford?" The business of that return loads bureau in Waterbury, just as any other city in Connecticut is to know what the merchants and manufacturers have in the way of loads, radiating out from their city. In other words, the loads are registered with them.

That way the driver gets his full load. That does not sound very big in Connecticut, but I am glad to tell you gentlemen that it is now established in every big center in Connecticut. It is established in Rhode Island. We had it established in New Jersey. Last week in Merchants Association, one of the biggest members you have, not only voted to approve the establishment within the Merchants Association of Return Loads Bureaus but also appropriated $5,000 as an earnest of their good endeavor to do it right. This coming week a transport return bureau is to be established in New York City. Philadelphia this week is doing the same thing.

Condition in New York

Conditions in New York, the big metropolitan center of the country, means thousands of motor trucks going and coming continually. In any of your cities the expense of operation is moderate, if the city is not too big. It is carried on in Connecticut without any additional men, by the chamber of commerce.

Our committee is working on this to the limit. We are issuing this week a bulletin of full instructions and detail how those should be established. This is all for one purpose, efficiency and economy in transportation. We are in war where waste is to be done away with. This is one means of doing away with a very distinct transportation waste.

For some time past we have been working with the railroad administration on the problem of getting the freight moved more rapidly from the freight station to the consignee. Congestion in terminals very frequently

Pathetic Figures

THE REAL ESTATE AGENT WHO IS TAKING SOME PROSPECTIVE PURCHASERS OVER TO LOOK AT AN "ALL YEAR" COUNTRY PLACE.
THIS HAS BEEN AN UNUSUAL WINTER I NEVER SAW THIS ROAD LIKE THIS BEFORE!

—Chicago Herald

means this. It means that the freight comes into the freight station instead of going out rapidly is left there on the floor of the station for some period of time, very frequently longer than the free time allowed it. The freight stations of this country had become storage warehouses. And it was for that reason in the large congested centers you have embargoes. A great number of embargoes have been placed this last winter. An embargo was placed on New York only a couple of weeks ago, lasting for seven days on any less than car load freight coming into that city. Why was it?

The reason was this? The warehouses of New York were full. The freight platforms of New York were full. And the merchants of New York were not taking away from these freight platforms the freight that laid there.

The railroad administration is not unmindful of the situation. They are making a very careful investigation, and it is very possible that within a very short time New York, being our biggest port and our most important port and one which is in perhaps the worst condition of any port in the United States to-day, will have what is known as store-door delivery, which means delivery not at the will of the consignee but immediate delivery the day that the shipment arrives on that freight platform. It means that an organization will be had down there, which will take those goods, and clear those freight platforms every night.

The railroad committee, operating under the Director General, have said if that condition can obtain they will increase the flow of business into New York City 50 per cent. That would probably mean no more embargoes on less than carload freight coming into New York because those platforms could not be cleared. This matter is now in the hands of the Director General for decision.

Every effort is being made to plant more acreage and plant more gardens, but let me tell that one of the most potent means of speeding up our food supply is to provide transportation to bring that food supply in when it is ready to be marketed. Out about the various cities of this country are thousands and tens of thousands of acres of land which could ship into the city a very large amount of food if any means were obtainable to get that food in easily and on a daily basis.

These problems came to us last fall, early, and we commenced the highways work. We found in Maryland a very wonderful system of rural express wagons was in operation. These rural express wagons start from the farm and they run into Baltimore. They run into Washington, but most of them run into Baltimore. They start at a radius of Baltimore and Washington of 12 miles, and some of them come in a distance of 47 miles every day, carrying the produce from the farm into the city. Those lines in the main reach farms that are not on the railroads or not upon any interurban line.

Passes Farm Door

What does it do? It passes past every farmer's door. He puts out at his front gate whatever he may want to ship into the city. He knows what time the rural express will come along. These rural expresses are motor trucks of 2, 3, 4 or 5-ton capacity, all of them privately owned, most of them owned by farmers. He puts those goods out at his main gate, it may be a case of eggs or it may be a can of milk, and there may be cream, and there may be an occasional piece of live stock, and the motor express comes along and finds what he has there. It is tagged who it goes to in the city. He picks it up and goes on to the next stop. He takes those goods into the city, and they are consigned to some particular person. In each instance those goods are either delivered to that person, it may be a commission house or merchant, or it may go into his freight station. Several of them have freight stations in Washington and Baltimore where these goods are placed. And that car turns right around in Washington and in Baltimore and picks up from the merchants of those cities the commodities that the farmer wants, and then they take them back and drop them at the gate of the farmer. This is round trip service. What is it doing?

It is making out of the gate of the farmer that lives on those lines a freight platform. And that, gentlemen, is what the farmers of this country need, transportation at their door, plus all other means of transportation.

We made a rather careful investigation of the rural express system as exemplified in Maryland, and I think Maryland has the best system of any state in the country, and in getting the data together, and for a very good reason, the rural express not only supplies transportation to the farmer and gives it to him daily, economical and efficient transportation that he can count on, to do the work and a convenient transportation. By giving him that daily service it lets the farmer stay on the farm to do the work that is necessary on these farms. And with the depleted man power that we have at the present time that I think possibly in this war time is one of the biggest factors. The farmer from his farm can ship his produce and he gets from the city what he may need without the necessity of going to the city. Back of the whole thing that affords the merchants of the city a very easy way of getting the goods directly to the farmer.

Co-operation with Others

Now we are co-operating with the Food Administration on this and also with the Department of Agriculture. I might say the department of Agriculture is so much interested in the introduction of rural express systems that they now have seven investigators out in the country finding out what the possibilities are, with the idea that they can recommend to the agriculturists just what value it can be to them and where it can be of use to them.

Look over a map of our country. The usual map you see shows an interlacing all over the country of lines of railways. It shows the waterways of the country, but rarely do you see a highway map of the United States, and partly for the reason that the highways in their grand total have made but little improvement. Each man that lives, whether he lives in the city or in the country, lives on a highway, and we are all more interested in the particular stretch of road that goes

past our house than we are in any other phase of that subject matter. To-day we need to look large, let our vision grow, and let our imagination play. No one can sit here and predict at the moment where the highway transportation is going and how big it is going to get. But, I can say this, I look for it to come just as surely as can be. That highway transportation is going to link up the farms of this United States on a regular service and on their main highway in this country, and that within a space of a very, very few years; in conjunction with the Quartermaster Corps of the Army and the Engineering Corps our committee was called on to assist in laying out the so-called military motor truck routes. You all read in the paper of the caravans, or convoys, as the Army calls them, of motor transportation coming from the middle west to the seaport. Those trucks generally are going to France. They are loaded with supplies. They are saving the congestion of the railroads to that extent, as only two of them can be loaded in a freight car, and there must be thousands and thousands of them moving to the seaport. They are carrying a load. In addition to that, the biggest point of all, they are giving for the first time in this country a training to the men who are going to drive those trucks, and who are driving them and who are going to France under army conditions.

How Trucks Move

Those trucks move in a formation of thirty trucks apiece. They are divided into sections of ten, with a man in charge of each section and the whole train in charge of the commanding office. In the winter time it was necessary to billet these men along the line because of the very severe cold. To-day these men are camping where nightfall finds them. They are living under army conditions. The first truck carries the kitchen, cook and food supplies. It does not make any difference where they find themselves to-day along the road. They **can** stop and make camp and cook their own food and stay there over night. All the trucks now running east are going through that way.

There is no time to-day in France to train truck drivers. This train is a training which not only is training the man but is weeding out any poor trucks. It is weeding out the problems, and each truck that might have to be tested after it struck France the run to the seaport generally is sufficient to give that truck a very wonderful test. When it gets to France it is in the best of shape as well as the driver.

The greatest difficulty in bringing those trucks east this winter was not the men or their lack of training, nor was it the trucks. It was the snow upon the roads. I do not know whether you realize it or not. We have rather been in the habit of, in this country, taking it for granted that when snow fell on our country highways we might just as well wait a while to use them, but when you are in war you cannot wait for snow to melt. These trucks had to go through, and they went through. They went through, I might say, from Detroit to Baltimore over roads that were in the main cleared, and cleared quite well, by the various state and county and township officials living along the line, who did that as a patriotic duty. They said if they want to go through we will clear those roads so that they can go through. And they cleared the way.

On the 12th day of February a truck train started to go from Detroit to Baltimore. That train took eight and a half days to make the trip. They reached Baltimore on the 21st of February. The very same day a truck train started from Buffalo to Baltimore. Their roads, as you know, are very much better than the roads from Detroit to Baltimore, but that train leaving Buffalo reached Baltimore on the 2d of March, having been eighteen days on the road. The trucks were just as good, and I know the men were just as good. In New York state there was so much ice and snow on the roads and there was no law which permitted the governor or the highway commissioners to clear those roads. So some of those roads cut down the trip to fifteen or eighteen miles a day, a ridiculous showing. The roads were better but the snow was there.

Let me predict again, we are coming to a point in this country and I hope it won't be long, when the highway traffic will be of such importance in our nation that the main highways in our state will be cleared 365 days in the year.

Why invest $20,000 in a mile of road, of the finest road that we can build, and then have that road so that we cannot use it in the winter time? It is inefficiency, and it is something that I think possibly the army trucks by the examples that they have set and the experience that they have had is going to change.

One of the additional reasons that the snow should be removed is an engineering reason, and rather interesting I think is the fact that on many of the highways where snow is removed the experience of the highway engineers is that it is shown that the break up of that road in the spring is not anywhere near as heavy as the break up would have been if the snow had stayed on that road until spring comes. There is really an economical side outside of the mere clearing of the road for the benefit of the public.

We have been in touch with the inland waterways committee of the Railroad Administration, and previously in touch with John Black, who was the Governmental representative on the subject with this idea in view; the waterways not in every instance start where the freight originates or land where the freight is destined to. Traffic over the waterways very frequently must come to the boat over the highway. I am full of predictions to-day, but we are going to match up the waterway system—inland waterway system—with the inland highway transportation system, which will take freight from the stations, and take it down to the waterway system and deliver it to the boat and the boat will take it and then again the motor truck will take it from the boat at destination and deliver it to the final destination.

Today right in Akron there is a very great motor truck service operating between Akron and Cleveland. A goodly proportion of the freight which is delivered to Cleveland goes from Cleveland to other cities, among the lake ports. It goes up from Akron to Cleveland, by motor truck, is delivered at the boat, and it is on its way. Simply another little picture of the possibilities that are coming up, tieing up water transportation and motor truck transportation.

This is a subject which needs study. Every local condition is different. It is a subject which means much for the commerce of your particular communities. Such a committee could give the whole matter their intelligent thought; such a committee might develop a very excellent point of contract with which our committee might work, and many of the questions which are coming up in the city from which you come. It is something I would like to have you take home and consider and if such committees are appointed just advise the Highway Committee National Council of Defense, Washington, and we will see that you will be kept in touch with what we are doing.

No Government Highways

The Government at the present time has no highways in the United States. It has roads within the cantonments, but so far as I know there is no Federal road or highway in this country to-day. Whether that condition will come where we will have routes similar to the main roads of France, maintained and controlled absolutely by the French government, whether the time will come when we will have those roads in the main highways of this Government, whether that time will ever come I cannot say. It rests with you. You are the Government. The government takes over what it should take over. So that really in a matter of that sort it is impossible to predict.

It is simply a question of what the people of this country want. A new type of transportation carrying every year millions of tons of freight is coming into being, and it has possibilities you cannot put down on paper. It has perhaps the greatest potentiality or potential possibilities of any form of transportation that we have. We are going to have a net-work of good highways in this country. If we cannot have them during this war, we can have some of them. We ought to have all those highways which are essential to the conduct of business—the conduct of our military establishment. All of these highways will help to win the war.

It seems reasonable to me that the movement of all the freight in the future in America for moderate distances is going to be over the highways from door to door. This is certainly worthy of your careful study. You are going to see articles and literature of all sorts, and you will have all sorts of opportunities to become more familiar with it, because the development of highway transportation is looked up as news to-day.

I want to impress on you that you can help guide this form of transportation. This is your opportunity to be in at the beginning of the wonderful new form of transport in these United States, and to each one of you individually to help guide the future of this wonderful new mode of transportation.

BAY STATE MOTORS GAIN

Boston, Mass., April 12—Some idea of the utility of the motor vehicle and the necessity for keeping abreast of the times by use of the modern method of transportation is shown by the figures of the Massachusetts highway commission for the first three months of this year compared to the same period of a year ago. April 1 of 1917 95,798 machines of all descriptions had been registered. For the first three months this year the figures are 110,775. That is 14,977 more machines.

An analysis of the figures shows a greater percentage of commercial vehicles than passenger cars. The total passenger cars listed a year ago for this period was 78,439; this year 86,820, or 8381 more. Commercial vehicles were 17,359 last year and 23,955 this year, a gain of 6596 in three months.

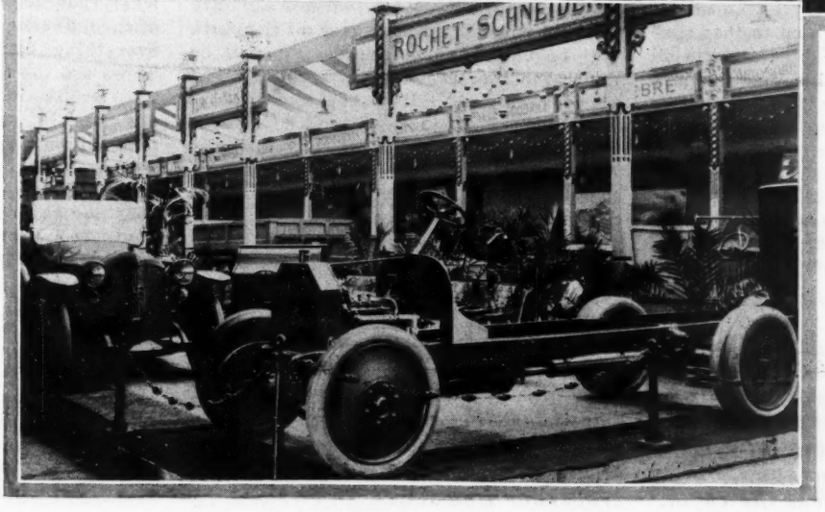
The motor industry continues to shower its money into the state treasury, $132,294.41 more being received this year than for the early part of last year, while the total soon will be $1,250,000. Here are the comparative figures:

	Jan. 1 to March 31, 1917	Jan. 1 to March 31, 1918
Total vehicles	95,798	110,775
Passenger cars	78,439	86,820
Trucks	17,359	23,935
Makers, dealers	3,055	2,233
Motorcycles	3,393	4,024
Chauffeurs	10,042	8,774
Renewals	22,024	26,765
Examinations	3,101	2,942
Receipts	$1,058,674.14	$1,190,968.55

Lyons Trade Fair

Above is an exterior view of the motor car section at the Lyons fair. The military element was much interested in American plows

Motor cars featured the Lyons trade fair this year as never before. Interest in the displays of 3800 exhibitors seemed to center here with more French cars



Senator Herriot, Mayor of Lyons, starting the machinery which will lay the foundations of the Lyons Fair Palace, which is to cost $5,000,000 at the least

Liberty Bonds—A Good Buy for Yo A

THE industry in its various branches is coming through on the Third Liberty Loan campaign with a vim. Motor trade associations all over the country are organized to help strafe the Hun with Liberty bonds. Motor clubs are doing their part. The home plants are piling up high scores. Some of them already have made sales in the plant to every employee. On these pages you will read of the work that is going on and will go on until the war is won. At the same time Motor Age presents another good, logical argument for buying—and selling—Liberty bonds. It is, in brief, a speech delivered by Governor Frank O. Lowden before the war editorial conference of the business press of Chicago, in which Motor Age is included. It needs no excuse for its reproduction here. It speaks for itself.

Where some of your money will go when you buy Liberty bonds. These a Liberty

By Frank O. Lowden

THERE is not anyone, man, woman or child, beneath the protection of our flag who does not want a speedy peace. Above our desires for a speedy peace, however, we should first resolve, and resolve again and again, that though this war may last years we shall be steadfast until it ends, and we will, then, prepare ourselves for a long war. There is only one thing, by any possibility, which can make us lose, and that is if we shall not realize to the fullest extent what this war means. If the American people will only visualize the consequences of this war; if they will only represent to themselves what this country will be like in the event we lost—I know the American people well enough to know that we shall win, and win triumphantly.

Away with Illusions

We cannot win if we are going to foster illusions about the consequence of this conflict. We must not whisper to ourselves that the war is 3000 miles away. It is not 3000 miles away. There has never been a war in all our past so near the hearth and hearthstones of every man and woman as this war. We have had great wars in the past. There are very few here who cannot recall the Civil War, which up to that time had been the greatest crash of arms in all the history of time. But black as the days of that war were, filled with gloom as the skies were, that war was not as close to our home as is this war to-day. And I will tell you why. If we had failed in that war, whether we were of the North or of the South, to whichever side we belonged, if we had failed in that war, all would not have been lost. We of the North and they of the South would still have had some kind of a country which we could call our own; ours in the North and theirs in the South would have been fragmentary—inglorious, if you please, falling far short of the glorious destiny of which our fathers at Lexington and Concord dreamed—but still there would have been some country which would have been beneath the protecting folds of our flag, some place which we could have called our home.

If this war goes against us, all is lost, and I measure my words when I say this. Because when this war is over all the earth will be one thing or another; it will be under the iron heel of military despotism everywhere or it will be free everywhere; if the war is lost there will not be room in all the sky for even the littlest American flag or any other flag of liberty and freedom and humanity, but the ruthless eagles of Prussia will rule the air and will oppress the earth.

This is not a war singly between two countries jealous of each other's territory or envious of each other's trade; it is a war between two ideas, which have been in conflict since the dawn of time. The idea on the one hand is that man is worthy, that man is entitled to rule himself, that man is worth living for and dying for, that just common humanity should dominate the globe. The other idea is that millions of men are only of use if they serve the masters of the state; that there is no place for them except to delve and toil in order that a few thousand men may enjoy the beauties of the universe, the right to rule, may enjoy everything beyond the drudgery of toil. Those are the two ideas that are engaged. They are the ideas which met at Lexington and Concord, when those embattled farmers fired the shots which were heard around the world. That battle has been raging ever since; somewhere it has been raging from that day to this. And now the grand and final clash between these two forces has come, and the same old battle which flashed forth on the Atlantic seaboard a century and a half ago is raging around the earth. It is a battle between these two ideas, not for one country or another but for possession and mastery of the globe.

If anyone has any doubt of the soundness of this proposition all he has to do is to read the literature of the German autocracy for the fifty years preceding the outbreak of this war. Then if he would attrib-

"If this war goes against us, all is lost, and I measure my words when I say this. Because when this war is over all the earth will be one thing or another; it will be under the iron heel of military despotism everywhere or it will be free everywhere; if the war is lost there will not be room in all the sky for even the littlest American flag or any other flag of liberty and freedom and humanity, but the ruthless eagles of Prussia will rule the air and will oppress the earth."—Governor Lowden.

Yo And a Good-Bye for the Kaiser

These a Liberty trucks taking part in the Liberty Loan parade at Cleveland, Ohio, April 6

ute that literature simply to the vagaries of some college professor, all he has to do is to trace step by step the German armies from the time they crossed the Belgian frontier. He will find that every step they have taken, down to this last one of crushing Russia, is in pursuance of a conspiracy that had its birth in the imperial court of Berlin before we were born. If he has any doubt about the correctness of this statement, let him read Treitschke and Nietzsche, let him go to Bernhardi and there learn that when this war was opened it was opened deliberately upon the chance of either dominion or downfall.

"Over the Top"

DETROIT, April 15—Detroit's quota of $36,000,000 of the Liberty Loan was over-subscribed by noon April 12, after working only five days. The total of the subscriptions on that day aggregated $38,652,625. A new quota of $60,000,000 was placed by the committee. To-day has been set aside as factory day and it is expected that approximately $3,000,000 in subscriptions will be reported from at least 35,000 and possibly 40,000 workers of the factories. It is believed that the employes of at least five of the city's largest factories, and probably others, will report their subscriptions through the various selling divisions at to-day's meeting. These employes are from the Packard Motor Car Co., Dodge Brothers, Solvay Process Co., Lincoln Motor Car Co., and Timken-Detroit Axle Co. These subscriptions aggregate more than $2,000,000, and it is expected that the employes of the Cadillac Motor Car Co. will report at the same time. All these concerns already have announced their own purchases, but reports from their employes have not yet been received. A subscription of $200,000 to $300,000 is expected from the Studebaker Corp. The list of some of the industrial concerns from this territory as it stood April 14 follows:

Henry Ford and interests	$6,000,000
Great Lakes Engineering Works	1,000,000
Dodge Brothers	1,000,000
Packard Motor Car Co.	600,000
Fisher Body Corp.	500,000
Lincoln Motor Co.	500,000
Hudson Motor Car Co.	400,000
Cadillac Motor Car Co.	400,000
Maxwell Motor Co.	350,000
Solvay Process Co.	300,000
Detroit Copper & Brass Rolling Mills	250,000
Charcoal Iron Co., of America	250,000
Burroughs Adding Machine Co.	250,000
Michigan Copper & Brass Co.	200,000
Detroit Shipbuilding Co.	200,000
Timken-Detroit Axle Co.	200,000
Sement-Solvay Co.	200,000
J. F. Ford Co.	150,000
Detroit Steel Casting Co.	100,000
Paige-Detroit Motor Car Co.	100,000
Continental Motor Corp.	100,000
Detroit & Cleveland Navigation Co.	100,000
Northway Motor Co.	100,000
Detroit Steel Products Co.	100,000
Morgan & Wright	100,000
Michigan Smelting & Refining Co.	100,000
Detroit Iron & Steel Co.	100,000
Buhl Malleable Co.	100,000
Hayes Manufacturing Co.	100,000
Edmunds & Jones Corp.	75,000
Edmunds & Jones Corp.	75,000
Detroit United Railway	75,000
National Twist Drill Co.	50,000
Detroit Stove Works	50,000
Peninsular Stove Works	50,000
Michigan Stamping Co.	50,000
Motor Products Corp.	50,000
Roehm & Davison	50,000
Roeb & Davison	50,000
General Aluminum & Brass Co.	50,000
Federal Motor Truck Co.	40,000
Continental Motors Corp.	40,000
Hupp Motor Car Corp.	30,000
Jeffery-DeWitt Co.	25,000
Detroit Lubricator Co.	25,000
Jeffery-DeWitt Co.	25,000
Penberthy Injector Co.	25,000
Roy D. Chapin	25,000
Howard E. Coffin	25,000
National Can Co.	25,000
Detroit Twist Drill Co.	25,000
Wilson Body Co.	20,500
Gear Grinding Machinery Co.	11,000
Kales Stamping Co.	10,000
Capitol Brass Works	10,000
Roberts Brass Mfg. Co.	10,000
Mutual Electric & Machine Co.	10,000
Detroit Branch, International Harvester Co.	10,000
Gemmer Mfg. Co.	10,000

ASSOCIATION LOAN CAMPAIGN ON

Chicago, April 15—The Third Liberty Loan campaign of the Chicago Automobile Trade Association shows every indication of surpassing the mark of the second, and already over $500,000 has been subscribed by motor car dealers, employees, garagemen, motorcycle men, etc. Twenty-five salesmen are calling on 450 garagemen, the same number of liverymen and some 800 other concerns representing the industry. The committee in charge is composed of George H. Bird, president of the association, who is handling the passenger car division; E. J. Kilborn, in charge of the truck division; Ward Perry, accessory dealers and their employees. Garages and liverymen are represented on the committee by H. E. Halbert and F. M. Johns, respectively; R. C. Crist represents the motorcycle dealers; A. W. Moore, the tire concerns; and W. J. Hughey, the body and wagon builders.

CHAMPION 100 PER CENT

Flint, Mich., April 13—Not only did the Champion Ignition Co. as a firm take bonds to the extent of $50,000, but 100 per cent of its employees have subscribed to the Third Liberty Loan, the amount raised in this way being $45,000.

"The next great development along the line of industry will be when the governments of the earth learn that the wisest diplomacy is honest diplomacy; when the governments of the earth shall learn that to plant spies in the midst of a foreign and friendly people is to plant the seeds of future disaster; when diplomacy shall be conducted in the sunlight of truth and candor and no longer be marked with treachery and deceit."—Governor Lowden.

Results of Headlight Tests

Forty-nine Observers Help Determine Intensity of Light Necessary for Proper Driving

NEW YORK, April 11—Experiments made to determine the minimum intensity of light necessary to reveal to car driver the presence in the road of a pedestrian in dark clothing at distances of 150 and 250 ft. and the maximum amount of glare from the headlamps of approaching vehicles, made here recently under the auspices of the Illuminating Engineering Society, New York section, and the Lighting Division of the S. A. E. Standards Committee, were reported upon at a joint meeting of these two bodies held at the Electrical Testing Laboratories this evening.

The tests were held on a piece of road between Pelham Parkway and the Morris Park railroad station. Two pairs of parabolic headlamps were used, mounted on stands supplied with current from a storage battery. In series with each pair of headlamps were an adjustable rheostat and an ammeter. Before the tests were begun, the field of light in which the men were to be observed was mapped at both 150 and 250 ft. from the lamps, illumination measurements being made over the entire field by a Sharp Millar photometer, while the currents applied to the lamps was held at a given value. Illumination measurements at a given point also were made with other values of the current, so that the ratio of illumination change to current change was determined.

Forty-nine Observers

The flux density produced by the glaring lights in the observer's eyes was measured by placing a photometer on a chin rest used by the observers and measuring the illumination at eye level. This was done with different values of current. Subsequently during the test only ammeter readings had to be taken, as the intensity of illumination at any particular point for any given current was known from the preliminary test. A few photometer readings for checking purposes, however, were taken.

Forty-nine observers took part in the test, and a statement was obtained from each as to the amount of his experience in night driving. The results are compiled in a table. Each observer sat at the rheostat and adjusted the amount of light himself to a point where he considered that he could see the person in dark clothing in the road sufficiently distinctly for safety in driving, and he also adjusted the intensity of illumination from the pair of lamps intended to represent the headlamps of an approaching vehicle until the glare was what he considered to be the maximum permissible.

As might be expected, the results arrived at by the different observers varied widely. The candlepower which different observers considered necessary to see a person in dark clothing at a distance of 150 ft. ahead of the car with sufficient distinctness for safety varied from 1000 to 10,000, the average of all observations being 3200. Similarly, the candlepower considered necessary to show a person at a distance of 250 ft. ranged from 1300 to 18,300, the average being 6980.

In the glare tests the headlamps intended to represent those of an approaching vehicle were arranged at a distance of 100 ft. from the observer, and the observer adjusted his own headlamps to such an intensity that he could just see a person in dark clothing in the road at 250 ft. He then adjusted the other pair of headlamps until their glare was about all he could stand. The candlepower of the approaching headlamps arrived at under these conditions by the different observers varied from 80 to 850, the average value being 239.

The results also were worked out in foot candles. It may be explained that a foot candle is the intensity of illumination at a distance of 1 ft. from the source of illumination equal to 1 cp. The average intensity of illumination required to see a man at 150 ft. was 0.142 foot-candles and at 250 ft., 0.112 foot-candles. The average glare which the observers could stand from a pair of approaching headlights at a distance of 100 ft. corresponded to an intensity of illumination of 0.024 foot-candles.

D. T. Sharp, who made the report at the meeting, dwelt on the wide variations in the results obtained by different observers. He said that it was in part due to differences in eye sensitiveness in different individuals but more largely to psychological factors. One of the conclusions to be drawn from the experimental results, he said, was that 1000 cp. was the least luminous power to make a man visible at 150 ft., and a good deal more light was desirable. He said that preliminary tests made on a previous occasion had established the fact that the glare factor depended almost entirely on the intensity of illumination, that is, the foot candles. He further pointed out that the lamps used in the test were mounted on rigid stands, and the conditions, therefore, were not absolutely equivalent to those met with in driving on the road, as there were no flashes of light due to irregularities in the road surface. The results obtained, however, would furnish guidance both in legislative action and in the work of headlamp designers. The committee did not want too much importance attached to the results but believed that they would serve as a starting point.

It was shown by diagrams thrown on the screen that if the different observations were given different weights, depending upon the amounts of night driving experience of individual observers, the results could be brought into much closer harmony than if all observations were given equal weight. It was explained that the tests were decided upon as a result of a move on the part of the New York state legislature to enact a better headlight law. The New York senate had requested two committees of the Illuminating Engineering Society, the committee on legislation and the committee on headlamp illumination, for technical information. There had been hearings at Albany on the subject which extended over two days and were attended by chairmen of the committees referred to and other members of the society. It had been the view of the society that the proper thing to do was to obtain numerical values for the minimum intensity of illumination and the maximum glare permissible, but the results of the tests, which covered a range with limiting values of 10:1, showed the futility of this plan. The delegates to the hearing endeavored to convince the legislators that definite minimum and maximum figures for intensity of illumination should be given in the law, but the legislators did not know what a foot-candle was and refused to listen to the plea. The next best thing was to put the whole matter in the hands of a competent official, the secretary of state, and have him consult experts on the requirements. The latest plan was to have the secretary of state draw up the headlight regulations, including methods for determining whether or not a driver was complying with the law. The society, the speaker said, was very hopeful that something useful would be accomplished, as so many people were earnestly working on the problem. In a way the effort came under the heading of war service, for the reason that the railroads were greatly overcrowded and road traffic was increasing all the time. It might be that any law passed would hurt some and benefit others, but as far as the society was concerned, it had endeavored to be as fair as possible.

Results of Tests

Mr. Cravath said the results of the test in one way were exactly what might have been expected. The surprising thing was that in driving at night they constantly were passing cars with much more glaring headlights than what had been declared to be the tolerable limit by the observers. He had made some experiments on his own account and dwelt on what he described as some unconsidered aspects of headlights. When two cars approach each other on the road at night, owing to the illumination from both sets of headlamps the road between them is unusually well lighted. When the cars approach closely to each other there comes a point when neither driver can see past the other car, and this is not necessary because for an instant the driver can steer his car by memory. In the tests the conditions were different in this respect, and most of the observers at least tried to see past the approaching lights. In St. Louis, Mr. Cravath said, a serious attempt is being made to see that all cars have their lights adjusted for the proper illumination. The cars are taken to the municipal test station and photometric measurements are made to determine that their candlepower on a 42-in. level does not exceed 1200.

From some remarks made by one member

of the Illuminating Engineering Society it appeared that the society in its endeavors to arrive at the scientific basis for headlight illumination had met with some opposition on the part of manufacturers of devices for controlling illumination. He said that some time ago he had seen in the newspapers a statement from the New York board of health to the effect that the nutritive value in milk was about twice that in steak or eggs, value for value, and he said that butchers and egg dealers might not be pleased at such a statement, but the board of health disregarded this fact and came right out with the information in its possession.

COOK HEADS LANE TRUCK

Kaalamazoo, Mich, April 12—H. H. Lane has resigned as president and general manager of the Lane Motor Truck Co. and is succeeded as president by W. A. Cook, formerly with the Indiana Truck Co., Marion, Ind., who also will act as chief engineer. W. W. Lang of Kalamazoo is vice-president and L. W. Hamilton is secretary, treasurer and general manager.

The capital stock of the company has been increased from $25,000 to $250,000, which will be issued in blocks as the money is required for production increases. The output for 1918 is proceeding on a basis of 600 trucks of 1½, 2½ and 3½-ton capacity. During 1917 the company built and sold 107 trucks.

STOPS DRIVEAWAY ARRESTS

Uniontown, Pa., April 12—Official request has been made by State Highway Commissioner J. D. O'Neil to the chiefs of police of all cities in Pennsylvania asking no arrests or obstruction of drivers in delivering new cars without license plates from factory to dealers. The new cars and trucks are being driven over the state to relieve traffic congestion on the railroads and the highway commissioner is of the opinion that it is an imposition to compel dealers to take out a $10 license for one trip across the state.

WHEEL PLANTS ADD CAPACITY

Lansing, Mich., April 12—The Auto Wheel Co. and the Prudden Wheel Co. are installing new dry kilns and special machinery to handle the large Government contracts for escort wheels received sometime ago. Owing to the production that will be required of both plants, additions to the seasoning departments were necessary in both cases. The Auto Wheel Co. is constructing seven kilns, while the Prudden Company is adding a battery of twelve. The combined contracts for escort wheels total over $3,000,000.

MOSCOVICZ SUCCEEDS KAPP

Racine, Wis., April 12—George L. Moscovicz, who has been doing special work for the Mitchell Motors Co. for some time, has been made advertising manager succeeding F. K. A. Kapp, who resigned.

PACKARD TO MAKE 4-TONNER

Detroit, April 12—The Packard Motor Car Co. expects to put on the market 400 4-ton trucks in July. It has been one and one-half years since the company has produced trucks of this model.

Need of Grades in Oil

Selection of Lubricant According to Engine Type and Service

Tractors Form Basis for Fuel Consideration

MINNEAPOLIS, Minn., April 12—Need of different oils for so many different types of engines was deplored as a talking point for oil salesmen by H. C. Buffington, secretary Minneapolis section of the S. A. E., at the monthly meeting. His statement came out following a suggestion for standardization of oil specifications presented by Field Secretary R. E. Plimpton, who happened to be present. The oil men came back with the suggestion that if the manufacturers would improve their engines there would not be so much trouble and need for so many grades of oil.

The main talk of the evening was by William G. Clark of the engineering department of the Wilcox-Bennett Carbureter Co., Minneapolis, on "Tractor Motor Lubrication and Lubricating Oils." This was supplemented by a talk on distribution by Charles P. Fortner of the Standard Oil Co., and for the Vacuum Oil Co. on oil tests the speakers were J. V. Mahoney, automotive engineer for Minneapolis, and W. G. G. Godron, automotive engineer for the Argentine district.

Mr. Clark said 75 per cent of field troubles of the tractor was due to faulty lubrication. The oil system should be drafted for the type and service of engine to be utilized in any tractor. Heavy oil consumption must be expected and the splash system is especially easy to understand and operate and is deserving of its present use. The selection of oil should depend on the type of engine and the service use. Too little attention is paid by tractor manufacturers to the type of oil used and the requirement of the use of proper oils. Much of the failure is due to the factory service man who does not direct the kind of oil to be employed. There is a close relation between carburetion and lubrication.

Recent developments in physical chemistry, Mr. Clark said, are to be of assistance to show just what certain oils will do under certain conditions. He discussed certain tests he had made of oils four years ago, where exact measurements were made under conditions of engine that insured the same features of test for each oil under examination. It was demonstrated in one test that there is a variation in the friction of different oils, notably two oils were entirely different after 5 hrs. heat test, two of the same viscosity showed 1 hp. difference. It was found there is no distinct relation between physical properties and lubrication efficiency. The system requires more frequent cleaning in a tractor than in a motor car, where the oil gives six to seven times the service. The operator forgets that the oil wears out and gets dirty. Frequency of cleaning is made necessary by poor vaporization methods.

There are many good spark plugs on the market, the speaker said, for service. If the right type is used and the lubricating oil is clean there will be no fouling. The crankcase should be cleaned out frequently. To get lubrication efficiency and freedom from lubrication troubles the tractor manufacturer must ascertain the oil suitable for his engine. He must recommend a sufficient number of them to cover all territories and insist on their use. He must help educate the tractor owner in the care and importance of correct oil.

Mr. Fortner discussed the preparation by his company to give the farmer oil service in all parts of the country. Every 20 miles on railroad lines is a station, and with tank wagons the company will expect to deliver direct to the farmer.

Mr. Mahoney said practically all troubles of splash jobs are due to ignorance of the operator in replenishing the oil. He mentioned discovering that one service tractor expert told a farmer not to put oil in the lubricating system the first year and only once the second year.

Mr. Mahoney found in his investigative work as a field engineer that the field troubles of the lubricating system are ignorance on the part of the operator, ignorance of the tractor service department about its own engines and poor lubrication system. New systems and tractor schools are making the farmers better operators. Comparison in field tests of one oil against another gives astonishing data as to economy. There is a bigger difference in lubricating oils than the tractor or engine manufacturer realizes. The Vacuum Oil company has oil for each part of the engines on the market. They tell the farmer which oil to use and if a tractor falls down due to the oil used that oil will be sold no more in that district where it does not work.

Advantages of Diesel

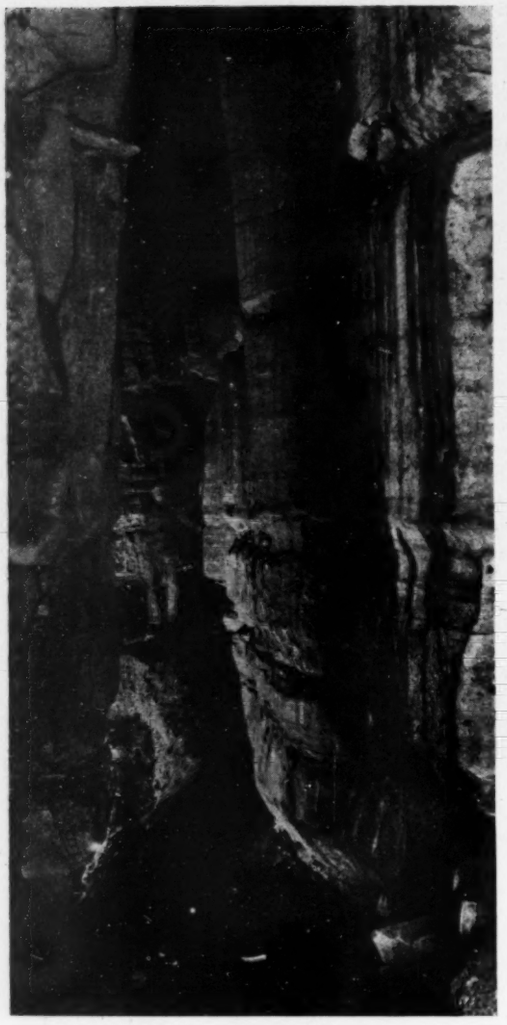
Mr. Godron, a Diesel engine expert, discussed the advantages and answered questions as to lubrication and fuel for this type of machine. It is the engine of the future, he said, and is certain to replace the steam engines where oil is to be had but perhaps not available for the tractor, motor car and airplane now or soon. What these advantages are as to saving of room by absence of boilers and coal bunkers, by utilizing the necessary space in the double bottoms for oil storage and the ease with which the Diesel can accomplish the change from full speed ahead to full speed astern he recited in full.

In the Diesel there is no chance for preignition because pure oil is utilized and there is no explosition as in the gas engine. It has almost clean combustion, even making no deposit when designed right as to fuel consumption on a clean paper held for some time at the exhaust. If the right oil is utilized there should be no carbon, he said.

The annual election resulted as follows: Chairman, H. C. Buffington, Minneapolis Steel & Machinery Co.; vice-chairman, J. L. Mowry, University of Minnesota; secretary, C. T. Stevens, Reinhard Bros. Co.; treasurer, J. S. Clapper, Toro Motor Co. May 1 Prof. J. L. Mowry will speak on "Resistance to Rolling of Tractor Wheels."

Our Most Wonderful Cave

Kentucky Offers Motorist World Attraction That Deserves Visit



Elbow Crevice is one of the cave's characteristic formations that give it that uniqueness that sets it apart as among the wonders of the universe

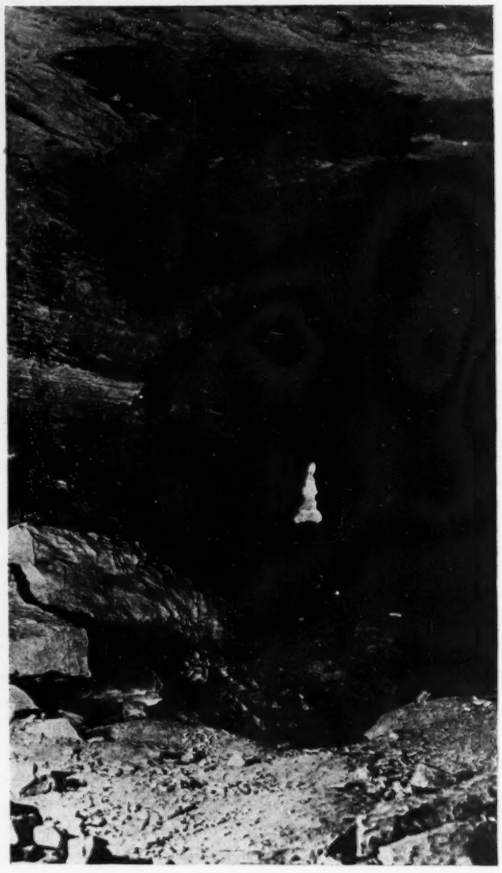
THE Dixie highway furnishes an excellent opportunity to visit the famous Mammoth Cave, the largest by far in the world and an attraction well worthy of a visit, even if the stop is but for a day or two. Assuming that no suggestions are necessary for the northern, western or eastern tourist in reaching Louisville, the route follows the Ohio river southwest to West Point; then it is straight south for 50 miles by Elizabethtown and Woodsonville to this famous wonder of nature which for more than a century has been visited by sightseers from all the nations of the world.

Government May Take Cave

Mammoth Cave has added interest from the report that it is being considered by the government as a secure storehouse for munitions of war. In conformity with the campaign of preparedness the government must provide a place "where moth or rust do not corrupt, nor thieves break through or steal." It has been pointed out that no place so adequately furnishes ideal conditions as Mammoth Cave with its 154 miles of known passageways and with explored space aggregating 12,000,000 cu. yd. The average width and height of the passage is 7 yd. No other nation is supplied with such a storehouse.

State Cedes Rights

A movement for the conversion of Mammoth Cave and its surrounding territory into a national reservation free to all people has been launched in Kentucky and is being adopted by the South in general. The state has ceded its rights to the Government and a bill by which the 2000 acres above the cave are to be purchased for $600,000 has been prepared. Naturally, the owners object to this action, holding that the terms are far short of the actual value. Their protest, it is feared, will be of no avail, if the pressure now being exerted by residents of the South continues to increase in intensity. It is hoped that this other natural wonder may be added to Niagara Falls, Yellowstone Park and other great attractions under the control of the United States.



Martha Washington's statue has been formed by artificial light. In the illustration it resembles nothing so much as it does a glorified keyhole

Mammoth Cave, while one of the greatest wonders of the world, has been visited by comparatively few persons. A surprisingly large proportion of these have come from other nations. In the campaign to see America first Mammoth Cave appears to have been somewhat slighted. Since the opening of the Dixie highway, the number of visitors has increased materially. Motor cars drive to the very mouth of the great cavern. Some day, especially if the Government secures possession, they may drive through the broader avenues underground. The highway winds through hills and lowlands, with here and there a picturesque bit of scenery, until the high tableland extending to the bluffs of the Green river is reached. The region is a hunter's paradise, abounding in quail and grouse. Formerly there were deer and other larger game even. The lay of the land furnishes a natural fortification. The Government could store an unlimited supply of war supplies for future needs. A handful of guards would be ample for the safe keeping. There is but one entrance with no danger of attack from above or below. All the aviators of the world could make no impression, no matter how deadly their bombs. There could be no loss through fire. There could be no loss through water. Nothing could be stolen. The even temperature of 54 degrees, the year around, with the highly oxygenated air, which has the purity without the rarity of the air of high altitudes, furnishes an ideal preservative and healthful condition.

Century-Old Pipes There

The cave still contains the wooden water pipes which were used by the niter miners of a century ago and which have been left undisturbed since the manufacture of saltpeter was discontinued. The pipes show no decay. Three-inch holes were bored lengthwise through the trunks of trees. One end of the tree was sharpened to fit into the end of another. Many hundreds of these primitive pipes were thus connected and carried water from the outside of the cave into hoppers con-

Echo river furnishes the setting for many a gay boating party. Boating is often by artificial light, but seldom underground as here

taining the nitrous earth, which was found in great quantities in various parts of the cave. The earth was hauled by oxen. After various methods of treatment the niter became gunpowder. During the war of 1812, the United States Government was excluded from all foreign sources of supply of gunpowder. There were interminable forests between Kentucky and the seaboard, but those who engaged in the manufacture of the saltpeter at Mammoth Cave transported thousands of pounds by oxcarts and packmules. When the war ended the demand for saltpeter subsided, and the manufacture at the cave was suspended.

Discovery in 1809 Probably

It is generally accepted as true that the cave was discovered in 1809 by a hunter named Hutchins, who was in pursuit of a wounded bear. The first record of ownership of the cave shows that it was bought, with 200 acres of land, for $40. The property changed hands several times and was purchased in the thirties by Dr. John Croghan. When he died in 1845, he left the estate in trust to be held unchanged until the death of the final heir. If the Government fails to take possession the property will be sold at auction immediately after the death of the final survivor named in the quaint will. Mammoth Cave property is owned by three persons, all of whom are more than 72 years old. Judge Alfred Janin of Washington, D. C., is trustee for the heirs and is in general charge.

The guides are of especial interest to all tourists. They have grown up in the cave and, in most instances, are grandsons of the men who served the tourists of two generations or more ago. Bishop, the senior guide, has been engaged in this occupation for thirty-eight years, hardly missing a day, summer and winter, in going through one or more routes He and the other guides have become so familiar with the wonders and beauties of the cave that the daily tour has become second nature.

Guides a Part of Cave

You think of them in connection with the stalactites and stalagmites, the great auditoriums of stone with ceilings resembling a starlit sky, the balanced and hanging rocks, the barren underground streams, and the sepulchral Echo river, 360 ft. below the surface of the earth.

A visit to the cave is not complete without a trip on mysterious Echo river. While this stream might not be of advantage if the government should utilize the cave as a storehouse, yet if it is thought necessary to secure an outlet from the cave by Echo river to Green river outside, it is believed that the necessary opening could be made by blasting. That the cave river connects with Green river has been proved by throwing chaff on the water. The level of the two streams is always the same. During the season of freshets, when Green river is high, the water backs up into Mammoth Cave until the lower chamber is completely filled. During the summer when the water is low, the distance between the surface of the water and the roof of the Echo river section of the cave is from 6 to 8 ft. It is the rising and

Festoons and draperies unite to make Violet City what it is, a conglomeration of the handicraft of many ages, which have left behind much of their eery mystery

The American Indians often had their ceremonial chambers underground. We have a banquet hall underground. It is in Mammoth Cave

falling of the water that wears away the rock. Geologists agree that the immense tunnels of Mammoth Cave were eaten out of the rock by the slow but irresistible action of acidulated water. After eating out the cave, the water partly fills it up again with dripstone. The slowly dropping water forms stalactites. About 5 years are required to make a deposit the thickness of a wafer. It may take 100 years to deposit an inch. Some of the stalactites of Mammoth Cave are many feet in diameter, indicating that it required thousands of years for their making.

Electricity May Come

Dreams are of a new Mammoth Cave should Uncle Sam conclude to take control. Electric light may come to the great rotundas that sparkle with mica, crystals and other formations and whose beauties cannot be fully revealed by the lights carried by the visitors or rockets shot toward the ceiling. An underground railway by which tourists can be carried to the accessible portions of the cave is an improvement both feasible and probable with Uncle Sam as financier.

Superlatives would give but a faint idea of the grandeur and beauty of the cave. Its dimensions are unknown. The rock of ages litters the floor, while fluted columns support the roof and festoons and draperies find climax in Violet City, the wonderful zone of silence, where the hours have no meaning and where time ceases to be. There is no day, no light, no change of seasons, no existence. Light, water and temperature, the three great forces of geological transformation, cease to change. It is as if the end of the world had come.

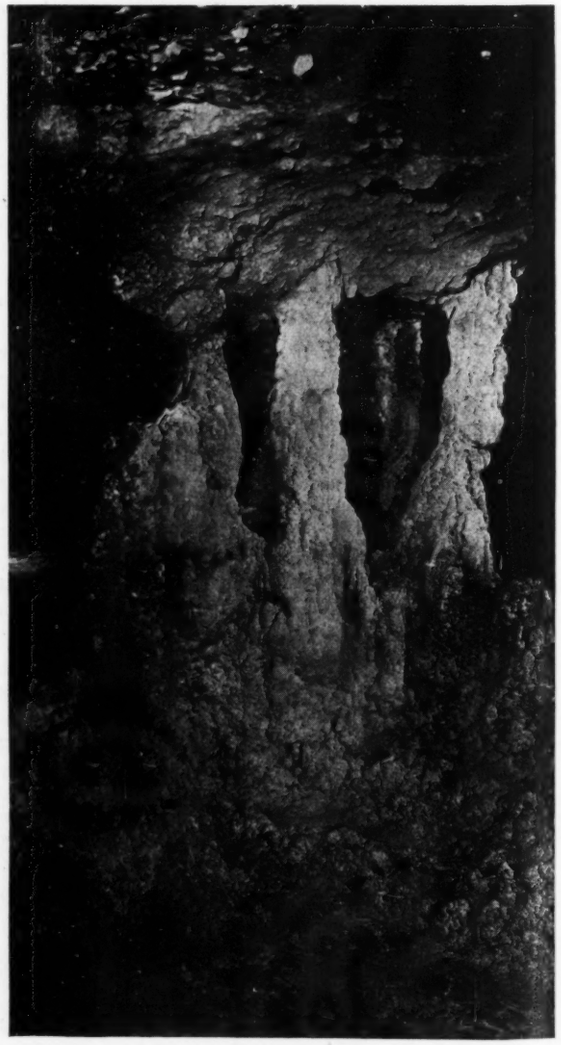
CONCRETE ROADS LEAD TEST

Detroit, April 12—The Packard Motor Car Co., has recently made some tests to determine the relative values of different roads, as regards resistance to tractive efforts. It has been found that unsurfaced concrete offers a resistance of 30 lb. to the ton, surfaced concrete 50 lb., gravel 82 lb. and dirt roads 99 lb. The experiment was performed with a Packard 3-ton truck carrying a capacity load and operating at a speed of 12 m.ph. Taking the unsurfaced concrete as standard, the truck will make 7.2 m.p.h. over surfaced concrete, 4.8 m.p.h. over gravel and 3.6 m.p.h. over dirt roads. This makes a relative cost of 0.167, 0.194 and 0.207 cents per ton mile in the last three instances.

A computation has been made showing that if all roads traveled were graveled as compared with dirt, the annual saving in operating America's 400,000 motor trucks would amount to $70,200,000; if concrete is compared with gravel, $167,400,000; and if concrete instead of dirt is used, $237,600,000.

Traffic Census

Going through other data collected from practical results with motor truck operations, a traffic census on the Cleveland-Akron highway proved that goods were being hauled over that road on motor trucks equivalent in tonnage to one freight carload an hour. This has since been increased substantially. The Cleveland Akron-Canton Transfer Co., operating a fleet of thirteen Packard trucks, accepts shipments in Akron late in the afternoon, for delivery in Detroit the following morning, connecting the two cities by overland express trucks.



No wedding bell hangs overhead, but the altar seems all set for an expected bridal party. Custom recognizes this provision in Mammoth Cave by naming this formation Bridal Altar

Routes and Touring Information

Memphis, Tenn.—Denver

NEW ALBANY, Miss.—Editor Motor Age—I expect to drive to Denver about May 1 or 15 and desire the best route. Is it better to go via St. Louis than through Arkansas?—S. R. Knox.

We suggest you go by way of St. Louis, driving through Gallaway, Brownsville, Dyersburg, Troy, Union City, Arlington, Cairo, Ill., Tamms and Anna to St. Louis.

From St. Louis route via St. Charles, Wentzville, Warrenton, Fulton, Columbia, New Franklin, Boonville, Marshall, Waverly, Wellington, Independence, Kansas City, Olathe, Ottawa, Emporia, Florence, Newton, Hutchinson, Great Bend, Kinsley, Dodge City, Deerfield, Syracuse, Lamar, Las Animas, La Junta, Pueblo, Fountain, Colorado Springs, Castle Rock, Denver, a distance of 1484 miles from Memphis.

Vols. 5, 6 and 7 of the Blue Books, published by the Automobile Blue Book Publishing Co., Chicago, contain complete running directions.

Carroll, Iowa—Medicine Hat

West Side, Iowa.—Publish the best motor route from Carroll, Iowa, to Medicine Hat, Alberta, Canada.—Sam Kemp.

From Carroll follow the Lincoln highway to Denison, leaving the highway at this point and going northwest through Mapleton and Holly Springs to Sioux City, Iowa. Here you pick up the King's highway. Follow it through Elk Point, Beresford, Sioux Falls, Dell Rapids, Brookings, Milbank and Big Stone City to Ortonville, Minn. An option from Sioux City, 9 miles shorter, would be through Westfield, Hawarden, Iowa, Hudson, S. D., and Canton. It would be well at Sioux City to make inquiry as to the better route between these points, as both are natural dirt roads and conditions are dependent upon the weather.

At Ortonville turn west onto the Yellowstone trail and follow it to Billings, Mont., through Twin Brooks, Waubay, Andover, Aberdeen, Bowdle, Mobridge, McLaughlin, Watauga, Lemmon, Hettinger, Bowman, Marmarth, Plevna, Ismay, Fallon, Miles City, Rosebud, Custer and Huntley.

From Billings divert from the Yellowstone highway and go northwest through Roundup, Lewiston, Great Falls, Shelby and Sweet Grass, thence to Medicine Hat. At Billings or Great Falls make local inquiry as to road directions to Medicine Hat. The free information bureau of the Yellowstone trail at Miles City, Mont., also will furnish information. The distance to Great Falls is 1340 miles.

Vol. 5 of the Blue Book contains complete running directions to Ortonville; Vol. 7 to Great Falls, Mont. These are published by the Automobile Blue Book Publishing Co., Chicago.

Little Rock, Ark.—Atlanta, Ga.

Charleston, Ark.—Editor Motor Age—Give the best route from Little Rock, Ark., to Atlanta, Ga.—M. T. Minden.

Motor from Little Rock through Hazen, Clarendon, Goodwin, Forrest City, Lovesque, Benson, Memphis, La Grange, Middleton, Tenn., Corinth, Miss., Iuka, Cherokee, Ala., Tuscumbia, Florence, Athens, Huntsville, New Hope, Tenn., River Ferry, Boaz, Attalia, Rome, Ga., Cartersville, Kennesaw and Smyrna to Atlanta. This is a trip of approximately 650 miles.

Vols. 6 and 7 of the Blue Books, published by the Automobile Blue Book Publishing Co., Chicago, contain complete running directions.

Wichita, Kan.—Elwood, Ind.

Pratt, Kan.—Editor Motor Age—Publish best route from Wichita, Kan., to Elwood, Ind.—H. S. Gregory, Jr.

Go north to Newton, meeting the Santa Fe trail. Follow it through Walton, Florence, Cottonwood Falls, Emporia, Waverly, Ottawa and Olathe to Kansas City. From this point follow the National highway east through Levasy, Lexington, Marshall, Arrow Rock, Booneville, New Franklin, Columbia, Fulton, Warrenton, Wentzville, and St. Charles to St. Louis.

From St. Louis continue on the National highway as far as Troy, 16 miles, from which point drive north to Litchfield, then east through Nokomis, Shelbyville, Mattoon, Charleston, Paris, Rockville, Bellmore, Bainbridge and Danville to Indianapolis. To reach Elwood, a distance of 44 miles, drive through Noblesville and Perkinsville. This trip is approximately 875 miles.

Vols. 4, 5 and 7 of the Blue Books contain complete running directions. These books are published by the Automobile Blue Book Publishing Co., Chicago.

A Man's Job

THAT all the women who are at work in the automotive and allied industries are not wartime workers is maintained by W. S. Porter & Co., makers of motor car accessories, Chicago, who for three years have employed Miss P. Marcus as a traveling salesman, or perhaps saleswoman would be better.

Miss Marcus came to work for the company almost at the beginning of its existence and has learned the company's products thoroughly from the mechanical end. She prefers the selling end of the game to the clerical and has made good in the work. In fact, she states that selling to the motor car trade is just as thrilling as being in moving pictures. Climbing mountains, falling down cliffs, wading streams, paddling through swamps and walking curbings to keep from wallowing in the mud are all in the day's work of selling ball joints, she says. However, she is optimistic and feels sure motor car factories are built in out-of-the-way places solely to make it interesting for the traveling salesman.

Miss Marcus is now one of the firm, holding the office of secretary.

Miss P. Marcus, oil saleswoman

For 3 Years

will manufacture 2½, 3½ and 5-ton trucks, which will be substantially the same as those heretofore produced by the old company, except that the rear axles will be greatly strengthened. The line will be known as the American. The company is preparing its plant so it can put trucks through on a production basis and expects to be in a position to put out from 1000 to 1200 trucks a year.

The officers of the American company are: J. D. Potter, president and general manager; Erwin Philips, vice-president and production manager; E. B. Alspach, secretary and treasurer; A. E. Shrimpton, superintendent, and F. M. Blair, chief engineer.

AMERICAN TRUCK BUYS BLAIR

Newark, Ohio, April 12—The American Motor Truck Co. has purchased the real estate, buildings, equipment, stock and other assets of the Blair Motor Truck Co., incorporating for $1,500,000. The company

MACHINERY MEN TO MEET

Cleveland, Ohio, April 15—May 13 1000 men representative of the manufacturers who are trying to meet the demand for machinery and tools to carry out the Government program for production of ships, shells, guns and aircraft will meet here to consider their problem.

The meeting which is to be a war convention will be a joint meeting of the American Supply & Machinery Manufacturers' Association, National Supply & Machinery Dealers' Association, Southern Supply & Machinery Dealers' Association and National Pipe & Supplies Association.

Airplane Construction School

Students Learn by Actual Building of Planes from Raw Materials to Complete Machine Ready to Fly

Students, jackies and faculty grouped before one of the school's planes

CHICAGO has probably what is the first school to teach airplane construction in an actual airplane factory. The Bud Morriss Airplane School, first opened last November, met with such a demand for the course it has created that one month after its inception it was obliged to move from quarters which were considered ample for a considerable period into a new building with 20,000 sq. ft. of floor space.

Students at this school are taught airplane construction by the very direct method of building an airplane themselves. They put through a machine of accepted Government pattern from the pile of rough lumber and raw metal to the completed plane, ready to fly.

The plan of instruction adopted is to drill the students in the theories of construction in the classroom, then send them directly to the workshop to put these theories into practice. No chance to forget what they have done. They learn why they are doing a certain job by receiving a thorough grounding in the theoretical side of it and then do the work with their own hands. The student graduates from this school are accepted in the Curtiss and other factories; in fact, Curtiss has asked for the co-operation of the school in furnishing it with trained men. Only recently a draft of jackies from the Great Lakes Naval Training Station entered for instruction, later to return to the Great Lakes as aviation quartermasters in the ground work school.

The classroom work includes instruction, by lectures not books, in elementary mechanics—the theories of matter, force and power, energy, motion and mass, of gravity and falling bodies; aerodynamic theories of air resistance and weights, streamline forces, wind tunnel experiments, lift and drift, dead-head resistance, etc.; aero design of airplane types and characters, wing curves and wing stresses, controlling surfaces, rudders and elevators, landing gears and fuselages, horsepower calculations, propellers, etc.; and the theory of airplane engine design and construction.

After the theoretical training into the workshop the students are obliged to construct from the raw materials ribs, spars, dowels, complete wings, which they brace, cover and dope; the control system, the fuselage, the engine bed, landing gear and struts, pylons, cabannes, propeller, etc. They do the body fitting, wing and tail fittings, learn forging, brazing, soldering and oxy-acetylene welding. Then the parts they have built are assembled by themselves into a complete machine, the wiring, rigging, lining up, bracing, engine mounting, etc. Finally there is a course in repairs and general maintenance of plane and engine.

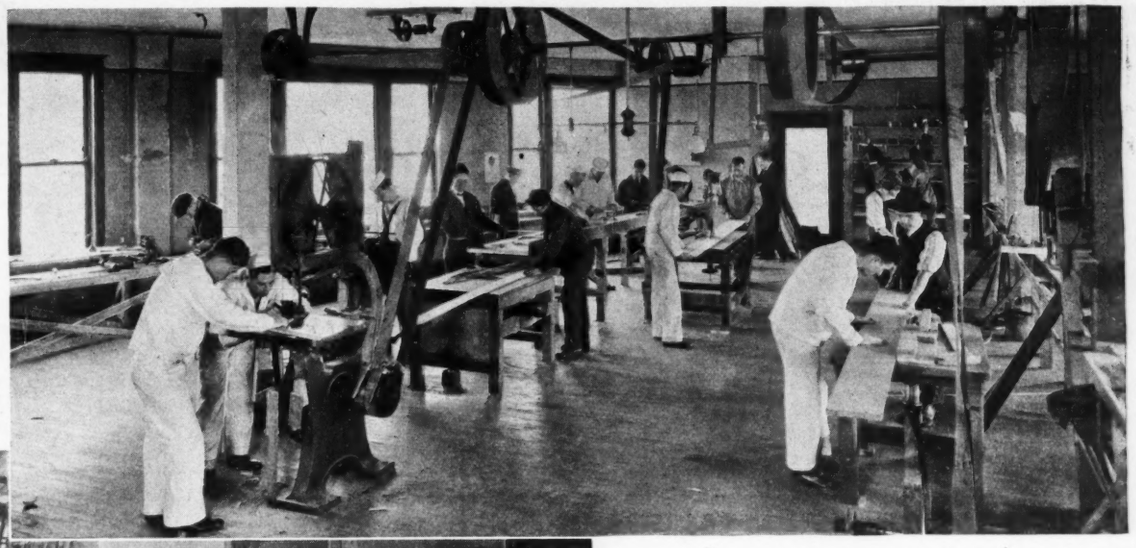
The new school is outfitted with necessary machinery of the type used in airplane factories so that a student is familiarized in shop practice of the most modern character. There is a propeller department, welding department, wood working department, motor department, metal fittings department, machine shop, assembling room, doping department, all separate divisions of instruction.

The Bud Morriss school first opened Nov. 1, 1917, in a building having 3000 sq. ft. of floor space. Within a month the enrollment so increased that a new building was procured, with 20,000 sq. ft. of floor space and completely outfitted with modern equipment.

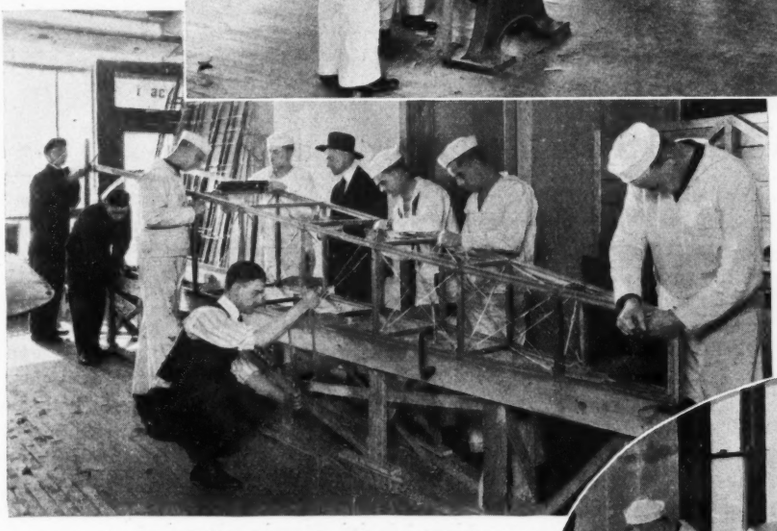
The faculty of the school has six head instructors, among them Bud Morriss, a flyer for seven years and formerly chief engineer of the Benoist Airplane Co., and Charles Patterson, former chief inspector for the Curtiss people.

The policy adhered to by the school is to teach a man thoroughly in the shortest time possible. Although the course as prescribed is of eight weeks' length, a student may stay over that time, indefinitely without extra charge from the school, until he is thoroughly competent in every branch of the work. No student is given a diploma at the end of the eight weeks unless he has fulfilled a very rigid schedule of examination. This plan puts it up to the student. If he wants to get through the course in eight weeks he can, but he can make up his delinquency by a longer term and can specialize more thoroughly if he so wishes.

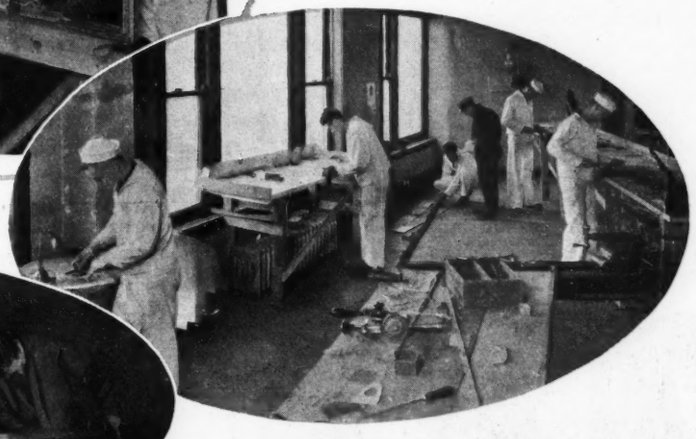
A class from the Great Lakes Naval Training Station learning acetylene welding



The wood-working department. Roughing out the wood pieces which later will be hand dressed to perfect airplane parts. Below, the sheet metal parts which go into the plane are being hand made



Assembling the fuselage. Every piece in the fuselage except turnbuckles is student-built



No student can graduate from the school until he is a proficient propeller maker. The students build the airplane wings, even to the covering and doping

Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the ninety-first installment of a weekly series of articles begun in MOTOR AGE, *issue of June 29, 1916, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., New York, in a size to fit the pocket conveniently.*

A thorough explanation of the fundamentals of electric circuits preceded descriptions of the general types of starting, lighting and ignition apparatus, signalling devices, magnetic transmissions, etc. This is being followed by the installation, care and repair of individual systems, beginning with the special equipment for Fords.

Part XCI—Eveready System for Ford Cars

THE Eveready starting and lighting system for the Ford car is a single-unit, single-wire, 12-volt system. The combined generator and starting motor unit is mounted on a bracket attached to the front of the car, and the shaft of the unit assumes the position normally occupied by the hand crank. The mechanical connection between the shaft of the electrical unit and the crankshaft of the engine is so constructed that the armature is driven at engine speed when the unit is acting as a generator, and the armature rotates 4.3 times as fast as the crankshaft of the engine when the unit is being operated as a starting motor. The starting switch is mounted in the housing of the unit and is operated electrically by an electromagnet which in turn is energized by moving the spark lever on the steering column to a full retard position, thus closing the circuit of the electromagnet at a special switch mounted on the steering column.

The operation of the starting switch closes the series circuit through the electrical unit, opens the shunt circuit of the generator field and also pulls a pawl into engagement with the ratchet teeth arranged around the outside of the gearcase, thus causing the unit to act as a starting motor, and connected to the engine with a reduction of 4.3 to 1. As soon as the pressure is removed from the retarded spark lever, the circuit of the starting-switch electromagnet is broken, the series connection is broken, the pawl is removed from engagement and the shunt field winding is connected. When the engine reaches a speed equivalent to approximately 11.5 miles per hour on high gear, the cutout will close and connect the generator to the battery, which should immediately start to charge. The cutout is located inside the housing of the electrical unit. A separate set of brushes is provided for the generator and motor functions.

Fig. 498—Removing starting crank and bushing in starting crank bearing

New Model Starting Bracket

Remove the Ford starting crank unit, Fig. 498. To do this reach down behind the radiator and locate the pin in the starting crank ratchet. Drive out the pin, pull out the crank and the ratchet then will be loose enough to remove. When these operations have been performed, drive out the starting crank sleeve from the front bearing as shown by operation in Fig. 498. The starting crank, the ratchet, the pin and the sleeve are to be discarded.

Remove the nuts from the spring clips holding the front spring to the frame cross member. The two nuts on the front of each of the spring clips are to be discarded, but the two nuts on the rear of the spring clips will be used again.

Drive both spring clips down so that there will be sufficient space between the spring clip and lower leaf of the front spring to permit the ears of the supporting bracket brace to be inserted. Be careful not to injure the screw thread on the spring clips while driving them down.

Take the assembled supporting bracket with its brace, and loosen up the nuts on the two flat-head bolts so that the brace is free to move. Then insert first one ear of the brace between the spring clip and the lower leaf of the front spring, and after one ear is in position it will be an easy matter to slide the brace back and put the other ear in place. Then drive the spring clips back into their original position, being careful to insert the front threaded ends of the spring clips into their respective holes in the supporting bracket.

Place lock washers over the rear threaded ends of the spring clips and put back the nuts that were on originally. On the front threaded ends of the spring clips place the rectangular spring clip lock plates, after which the new spring clip clamp nuts are to be screwed on to the front threaded ends.

Tighten up all four nuts, being careful that they are drawn up uniformly. It would be best to tighten them up one turn at

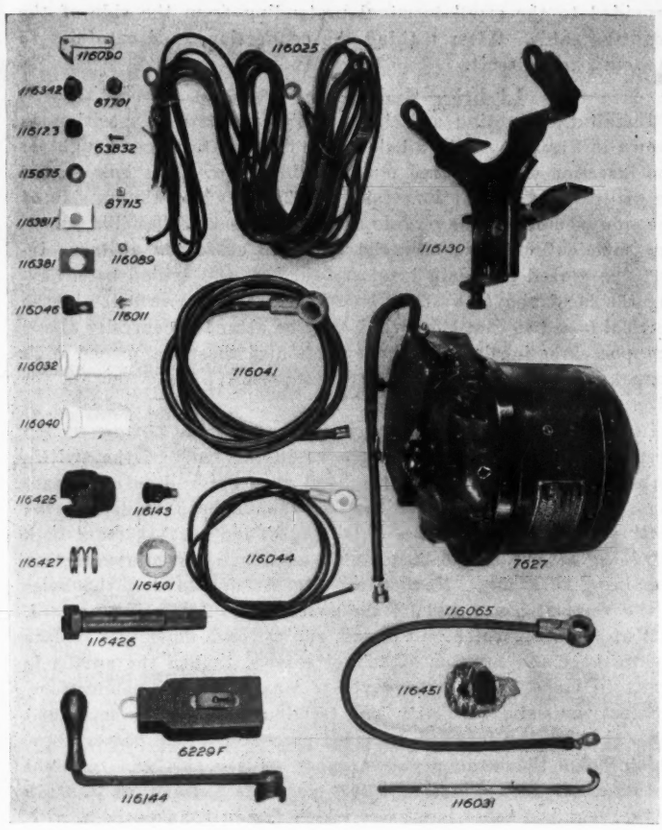


Fig. 499—Complete list of the different parts of the Eveready starting and lighting system for the Ford

a time. Be sure that the spring clips tighten the supporting bracket brace uniformly. Do not let one corner of the spring clip do all the work. While tightening up the nuts, see that the front of the supporting bracket is square and perpendicular; after the nuts are thoroughly tightened, the lock plates should be turned up to prevent the front nuts from loosening. The rear nuts will be taken care of by the lock washers that were put on.

The lock plates for the front nuts should be so placed that one side lies even with the flat side of the supporting bracket. This will prevent the plate from turning. Then turn up one corner of the lock plate against the flat side of the hexagonal nut. This in turn will keep the nut from turning. If there are poor threads on any of the spring clips, it would be wise to replace such defective spring clips with new ones having perfect screw threads. Be sure that all nuts are tight.

After the spring clips are drawn up home, tighten up the nuts on the flat head screws. This will complete the operation of installing the supporting bracket.

Next install the coupling shaft unit composed of parts 116426, 116401, 116427 and 116425, Fig. 499. Insert the coupling sleeve 116425 in front of fan pulley and turn it until the crankshaft starting pin engages with slot in the sleeve. Next insert the coupling shaft 116425 through the hole, from which the old hand crank and bushing were removed, until it protrudes through the rear about an inch. Then reach down behind the radiator and slip the spring retainer 116401 over the square end of the coupling shaft. Slip coupling spring 116427 over the protruding square end of the coupling shaft and push the shaft inward until the square end of the coupling shaft engages with the square hole in the coupling sleeve 116425 already in place. The completed operation is shown in Fig. 500.

Installing Electrical Unit

Remove the three cap screws from the back of the electrical unit, Fig. 499. One of these screws is at either side and one at the bottom. Place the electrical unit in position so that the clutch end of the shaft, Fig. 501, will engage with the clutch end

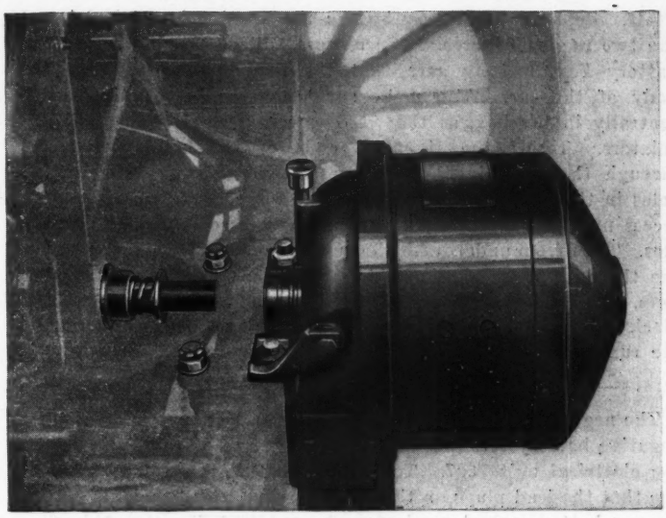


Fig. 500—Complete installation of the Eveready starting and lighting unit on the Ford car

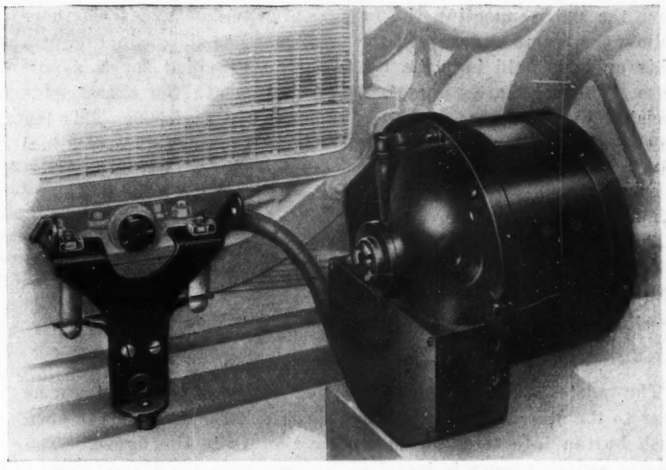


Fig. 501—Method of mounting the Eveready electrical unit on the Ford car

of the coupling shaft. The three holes in the electrical unit from which the screws were taken should line up with the holes in the supporting bracket shown in Fig. 501. When the electrical unit is in place, insert the two side cap screws and turn them up tight enough to hold the unit in place for the time being. Then insert the remaining screw in the same manner through the hole near the lower end of the bracket.

The next operation is to see that the coupling shaft 116426 is lined up as near the center as possible in the hole through which it passes. Raise or lower the adjusting screw until the proper alignment is secured. When coupling shaft is centered properly, screw up the lock nut on the adjusting screw and then permanently tighten up the two side cap screws and the screw near the bottom at the back of the supporting bracket. Remove the wooden plug in the head of the electrical unit and screw the grease cup in place. Fill the cup with grease, screw it down once and refill.

Installing Storage Battery

The sheet metal battery box should be placed on the right-hand running-board, having the side with the lock facing outward. The box is to be placed as near as possible to the body of the car, being centrally located between the fore and rear doors, so that both doors will clear the box when the cover is raised. When properly placed, indicate holes to be drilled in the running board by spotting through the holes in the battery box with a piece of chalk. Then remove the battery box and drill the holes in accordance with the chalk marks, but make sure that these holes are the same size as the holes in the battery box

itself. Replace the battery box on the running board and insert the two unglazed porcelain insulators. Place the battery in the battery box, making sure that the terminals are toward the body of the car. Also make sure that the battery is located centrally in the box, so that it does not touch the porcelain insulators. Insert the threaded ends of the hold-down hooks through the holes in the battery box and through the drilled holes in the running board and see that the hooks engage in the recess provided for this purpose in the sides of the battery handles. Then from underneath the running-board place washers over the threaded ends of the hold-down hooks and tighten up with nuts. The manufacturers recommend placing a small hardwood block over the threaded end of the hold-down hooks underneath the running-board before applying the washers and nuts.

Installing Wiring to the Unit

The negative cable 116041, Fig. 499, is to be connected with the negative battery terminal and the negative cable protruding from the electrical unit 7627. To accomplish this proceed as follows: See that the lead plugs on the cable and the lead terminals on the storage battery are cleaned properly and coated with a thin film of vaseline. When this is done, insert the small end of the cable through the forward unglazed insulator, run the cable up over the rod, connecting the two running boards and from there follow the frame underneath the mud guard as shown in Fig. 502. This cable is held in place by two clips provided for this purpose. The clips are to be fastened underneath the chassis side member by two nuts located as indicated in Fig. 502. This lug end of the cable now is to be placed over the negative terminal post of the battery.

The next operation is to connect cable 116041 with the short cable 7627. To do this pass the cable up over the front cross member as shown in Fig. 501, over the strut until it meets the longer cable. Fasten both cables together by tightening up the coupling nut and then carefully tape the joint to prevent the possibility of a short circuit.

Installing Master Switch

The master switch is to be installed on the steering column as near to the steering wheel as possible, Fig. 503. In case the horn push button interferes, lower its position as in the figure. The master switch proper is installed by fastening the clamp around the steering column and screwing it up tight with nut and bolt provided for this purpose. Next run the wire down the under side of the steering column, and pass it through the hole in the floor board. Continue the wire down the under side of the steering column to the left-hand side of the chassis, run it forward along the chassis and make connection by the screw and nut provided to the small terminal protruding from the side of the negative cable. After making the connection, tape carefully to prevent short-circuit.

Lighting Switch and Wiring

Install the lighting switch on the heel board in position as shown in Fig. 502. Drill a hole in the floor board large enough for the insertion of the glazed porcelain insulator. This hole should be drilled between the inner side of the body and the outside of the side member of the chassis and as far back as possible, allowing sufficient clearance for the wires to enter the switch. Insert the glazed porcelain insulator through the drilled hole, having the head above the floor board. Next drill two holes in the vertical board so that the switch may be attached centrally above the porcelain insulator. The switch also must be placed high enough up on the vertical board to permit of easy access for wires.

In case the car has a bead running across the bottom of the vertical board which fits the groove in the back of the switch, make sure that the use of this bead as a guide does not locate the switch too low. After the holes have been drilled in the vertical board take off the outside nut and washer from both attaching screws in the back of the switch. Do not remove the remaining lock nut. Now insert the screws through the holes in the vertical board, having the switch handle pointing upward. Lift up the seat, which will permit you to reach down and replace the washers and nuts on attaching screws. When the switch is firmly in place, remove the cover to make the wire connections.

Select the small wire with lead terminal and run the small end down through the forward unglazed porcelain in the battery box, which holds the large negative cable. Place the lead terminal of this small wire over the battery negative terminal and on top of the negative cable lug, after which fasten it in position with the screw previously removed from the battery terminal. Now run the small wire up along the chassis and draw it across to the left-hand side of the car where this wire, together with the taped group of lighting wires, is to be pushed up through the glazed porcelain insulator in the floor board preparatory to being attached to the various terminals in the switch.

Fasten the terminal of the wire coming from the battery under the head of the screw of the terminal post in the upper row, which is connected to the wide curved brass connecting strip.

The next operation is to connect the terminals of the four wires which lead to the headlights, sidelights, taillight and coil box. It will be noted that each of these wire leads has a letter, T, I, H and S respectively. The lower row of terminals in the switch box have corresponding letters to guide you in making the correct connections.

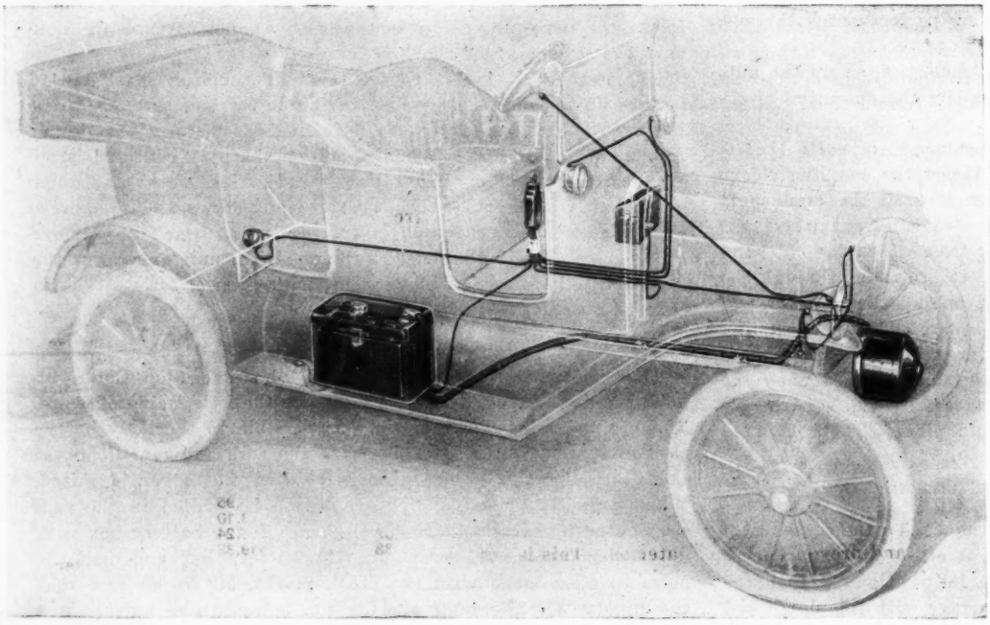


Fig. 502—Phantom view of wiring installation of Eveready system for the Ford car

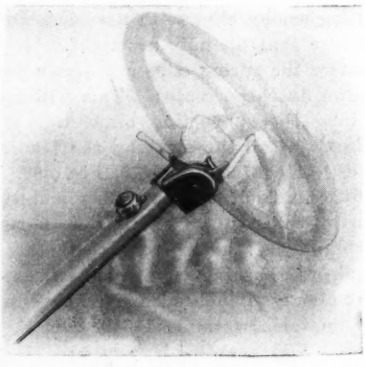


Fig. 503—Location of the master switch on steering column

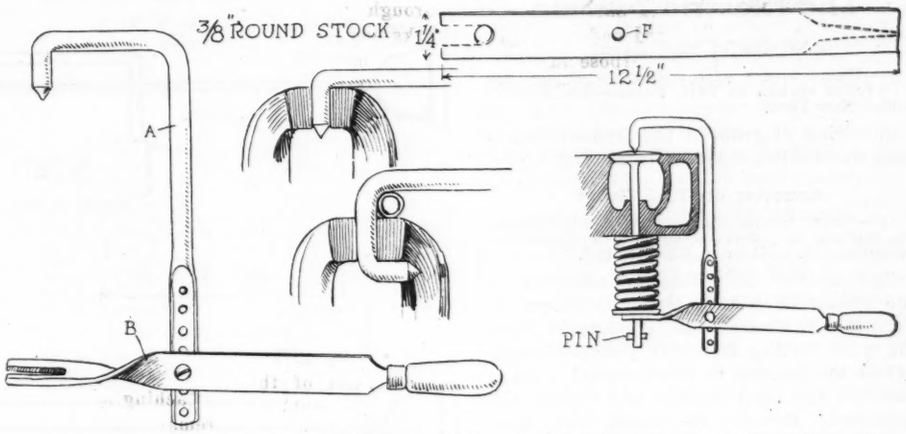
The Motor Car Repair Shop

Making a Valve Lifter

THE most difficult thing about grinding in a set of valves for most motorists is to get out the small pin under the spring. If one of the many forms of valve spring lifters is at hand the job becomes comparatively simple. On some cars having small springs the operation of removing the pins can be performed with the aid of a screwdriver and block of wood, holding the valve down with a clamp of some sort. The lifter described in this article can be made by anyone handy with tools and will do its work well, provided it lends itself to the particular engine in question.

There are two parts to the lifter, A and B, as shown in the illustration. The part A can be made first and requires a piece of iron or steel ⅜ in. in diameter and 17 or 18 in. long. A Bessemer rod of this diameter will answer for this. File one end of it to a point and place it in the jaws of a vise, giving it a sharp bend, as indicated in C. The part in the vise should be about 3½ or 4 in. long. Remove it and again clamp in the vise, this time as shown at D. Place a piece of pipe on top of one of the vise jaws and bend the rod over this. Flatten the other end of the rod out for a short distance from the end and drill six or seven holes $\frac{3}{16}$ in. in diameter about ½ in. apart. This completes part A.

Next get a piece of $\frac{3}{16}$-in. steel, 1¼ in. wide and 12½ in. long. Drill a ½-in. hole through it 1½ in. from one end. With a hacksaw cut two slots E-E, thus making a ½-in. opening in the end. File these ends down a trifle so the piece is about ⅛ in. thick at this point. Drill a $\frac{3}{16}$-in. hole F, about 4 in. from the end and then clamp the slotted end in the vise for about 2 in. With a large wrench give the piece a quarter twist so the forked end will be at right angles with the other part. The remaining end should be brought to a point like a file, so a wooden handle can be driven on. This can be done with a hacksaw and file or by heating the piece and drawing it out on an anvil. A $\frac{3}{16}$-in. bolt is inserted through the hole F and one of the holes in A, when using the lifter. The correct hole in A will be found by trial and the proper leverage thus secured.



Steps in the making of a valve spring lifting tool. Finished tool shown at the left, and, right, how spring is compressed for removing pin in valve stem

Storage Battery Repair

Sometimes the sealing compound on top of a storage battery becomes cracked, leaving seams through which the electrolyte leaks. The result is that the outside of the battery becomes covered with a white deposit which affects not only the terminals and other parts but often reduces very materially the battery's efficiency.

A repair for such a battery is not difficult to make, as it is only necessary to apply heat to the compound to melt it together again. The only tool needed is a sealing iron, consisting of an old soldering copper, or in the absence of this a putty knife can be used. Heat the iron or knife in a gas flame until it is quite hot. Then apply to the cracks lightly, running it along the latter so the pitch is melted properly together. The pitch melts easily and the iron must not be kept at one point too long or the even layer might be injured. If the compound has broken away from the sides of the case, terminals or vents, the same procedure should be used, that is, running a very hot iron quickly around them. A little experimenting will soon tell the operator how long the iron can be held at any certain point, to sufficiently thin out the pitch.

System in Repair

A little system in your repair work will save a great deal of time in the end. For instance, when the plugs over the valves and the spark plugs are removed, when the valves are to be ground in, these parts usually are placed on the bench or floor and left until the grinding job is completed, after which they are taken up and cleaned. The proper way is to place the plugs in a can half full of kerosene and allow them to soak during the time the valves are worked on. Then when they are to be cleaned the job is comparatively simple, as the soaking has loosened all the carbon, etc.

Much time is also lost frequently in removing nuts from bolts on the chassis, when the threads are covered with hard mud. Owing to the mud the nut is very hard to remove, as it has to cut away the foreign matter when it is backed off. The threads always should be cleaned first. This can be done with a stiff wire brush, soaked in kerosene. Sometimes an ordinary paint brush which has outlived its usefulness as such can be used, especially when the mud is soft.

In putting back nuts on bolts it is always a good plan to place a little graphite on the threads. It helps to run on the nut and prevents sticking later on. This is not so necessary with the bolts around the engine, as there is generally a film of oil over most of the engine's exterior anyway and this gradually works its way to most of the nuts and bolts. The bolts that hold the muffler to frame, brake adjusting nuts, etc., are the ones to treat with graphite.

Watch Oil Holes

Many owners are painting their cars at this time of the year and to these a word of warning must be given to watch out for small oil holes on the chassis, so they are not filled up with paint. This, of course, applies only to painting the chassis. For instance, there are oil holes in the caps of some radiator trunnions and if the owner is not careful they will be filled partially with paint, thus making it impossible for the oil to get to the bearing. Even though the hole might look open there may be just enough paint in it to prevent the oil from performing its function. All the small oil holes are there for a definite purpose, and many mysterious squeaks can be traced to one or more of them which either has been neglected or filled with paint. The holes always should be cleaned out before oiling, using a nail or small punch.

Never use too large an oil can when oiling these parts. Remember that oil on the outside of a bearing does no good whatever. Use a small can and put in two or three drops, as may be needed. A little oil applied at frequent intervals is better than a great quantity applied at long intervals.

WHEEL DIAMETER AND SPEEDS

Dia., In.	Circum., In.	Rev. Per Mile
24	75.40	840.3
25	78.54	806.7
26	81.62	775.7
27	84.82	747.2
28	87.96	720.3
30	94.25	672.3
31	97.39	650.5
32	100.53	630.2
33	103.67	611.1
34	106.81	593.3
35	109.95	576.2
36	113.10	560.2
37	116.24	545.0
38	119.38	530.7

The above table shows the diameter in inches of wheels, together with the circumference and number of revolutions the wheel makes in traveling 1 mile.

The Readers' Clearing House

The Electric System

Wiring of 1915 Regal

—Please give a wiring diagram of the electrical system on 1915 Regal.—Theodore F. Poetz, New York.

A wiring diagram of the Dyneto system used on the Regal is shown in Fig. 4.

Ammeter on 1915 Grant

Q.—Show wiring diagram of a 1915 Grant six touring car, showing method of connecting ammeter.—J. L. Horney, Clinton, Ind.

The method of wiring an ammeter in the circuit of a 1915 Grant is shown in Fig. 3. To install the instrument open the wire leading from the positive terminal of the battery to the terminal marked Bat. on the light switch and install the ammeter. Remove the small wire from the foot switch and attach it to the post marked Bat. on the lighting switch also.

Wants Wiring Diagram

Q.—I wish to install electric lighting system on a model 69 Overland in place of present gas light equipment. Will use Auto-Lite 6-volt generator with cut-out and ammeter, also storage battery, head, side, tail and dash lights. Show most suitable wiring diagram for this outfit; also connections to horn; also coil, as I wish to use current from storage battery for ignition, for starting only, as this car has a Remy magneto.—F. C. Heintz, Hewitt, Wis.

We believe that the wiring diagram shown in Fig. 1 will be applicable to your case. Although this does not show the sidelights connected, all you have to do is wire them up like the headlights. The wiring diagram of the Remy ignition system is shown in Fig. 2.

Adjusting Regal Generator Chain

Q.—I have a practically new 1916 model F Regal, which has run less than 1,000 miles. The engine has an annoying noise when running about 5 m. p. h. I think it is the generator drive chain being too tightly adjusted. When I bought the car it had this noise, but I thought after the car had been driven more, the chain would stretch and wear in, but up to the present time the noise is the same. I would like to experiment with the chain adjustment. Can all the adjusting be done by the eccentric bearing at rear of generator, or must the chain housing also be opened? Advise how to adjust this chain, or if you know the cause of this noise, please advise me.—H. T. Woita, Little Rock, Ark.

The plate at each end of the generator is machined up and so arranged that its periphery or circumference is eccentric with the armature shaft. The front end of the generator rests in the chain housing, which is cut away to accommodate the end plate, and a removable section of the chain housing clamps over the end of the generator when bolted in place. The rear end is supported in the same way, with a removable cap over the rear end plate. It is obvious that by turning the generator completely on its supports, the chain sprocket on the front end of the armature shaft will be raised or lowered and the distance between the center of the sprocket and the sprocket on the end of the engine crankshaft increased or decreased accordingly.

To tighten the chain loosen the four cap screws that hold the cap over the front end and take off this cap. Then loosen the screws which hold the cap over the rear end. Screw out the dowel screw in top of this cap part way and loosen the screws which hold the igniter driveshaft housing to the bracket that supports the rear end of the generator. Then turn the generator on its supports. To tighten the chain turn the generator out or away from the engine until all slack is taken out of the chain. To loosen the adjustment the reverse operation is performed. When replacing the clamp over the front end of the generator see that the thin piece of steel about 1 in. in length is put under the cap screw nearest the engine. This piece acts as a spacer for lining up the sprockets. Replace all of the clamps and fittings and tighten up the cap screws.

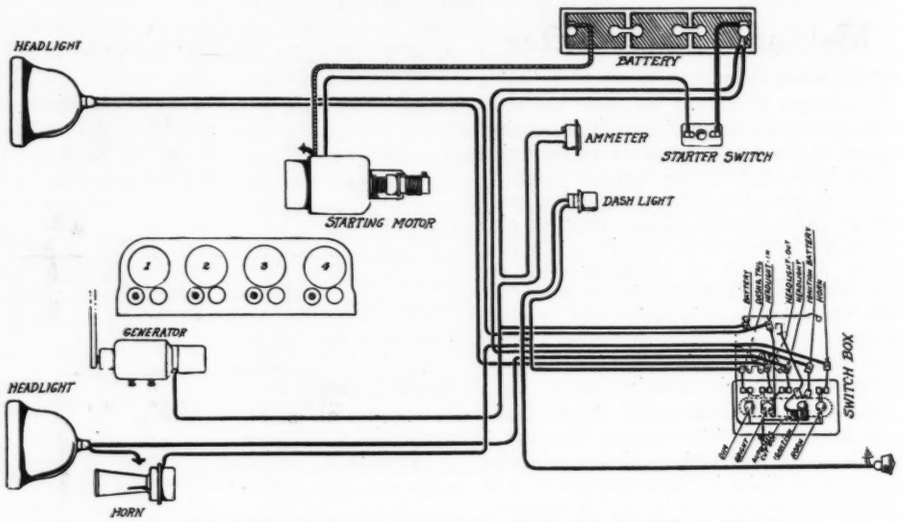


Fig. 1—Suggested wiring diagram to be used on the model 69 Overland

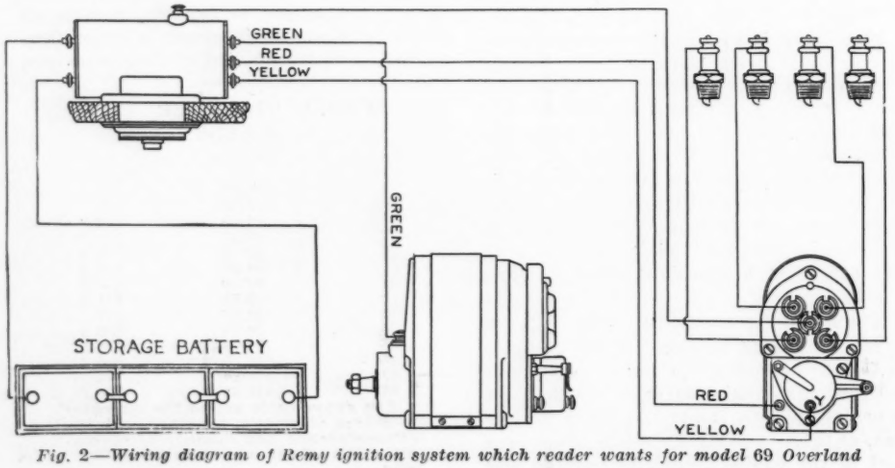


Fig. 2—Wiring diagram of Remy ignition system which reader wants for model 69 Overland

Engines

Wants to Drill Pistons

Q.—I have a Packard No. 18 model and would like to make a speedster out of it. Would it be any advantage in speed by boring a hole in the piston and also prevent oil from getting into the firing chamber?—T. A. Grass, Chicago.

We do not think you will gain much by drilling the pistons of this engine. A far better plan would be to fit some of the aluminum alloy or light-weight cast-iron pistons advertised in MOTOR AGE. If you should decide to drill your pistons be careful not to cut away any metal near the piston pin bosses. See the answer to Ritzville, Wash., in regard to preventing oil getting past the pistons.

Meaning of A. L. A. M. Rating

Q.—Explain A. L. A. M. rating.—C. S. Sorensen, Chicago.

The A. L. A. M., or more properly the N. A. C. C., rating is determined by the equation $\frac{D^2 \times N}{2.5}$, where D is the diameter of the cylinder bore in inches and N is the number of cylinders. This equation is based upon certain assumptions known to be representative of average practice, which include a mechanical efficiency of the engine as 75 per cent and the average pressure in the cylinder throughout the cycle as being 90 lb. At a piston speed of 1000 ft. per minute it is expected that the average engine will develop its rated power as determined by the equation. This is the equation that is used almost universally in de-

termining the horsepower of engines when applying for licenses.

Engine Starts Hard

Q.—I have a Studebaker 35, 1913, which will not start until I prime it. This car has new Dixie magneto with Sumpter coil for starting on batteries. After the engine gets started, it runs all right and will start after it gets warm. This car has the same carbureter that came with it. What is the reason for this?—J. C. Smith, Camp Hill, Ala.

Hard starting may be due to inability to vaporize the fuel or insufficient spark. There are other things, of course, such as leaky valves and pistons. If this car has a rather long intake manifold, the gases condense on the walls of it and run back to the carbureter. When you prime the engine the gasoline vapors are brought into the top of the engine and much closer to the plugs. This results usually in the engine firing, sometimes running only long enough to run out all the vapor so introduced. Once the engine becomes warm the gases do not condense so much and the engine can be started easily. We suggest that you try shortening the manifold, if this can be done conveniently.

Reboring Maxwell Valves

Q.—How much larger will it be safe to make the cylinders and valves of the engine in a 1917 Maxwell and approximately what would be the increase in power, if any?—J. P. Klein, Idaho Springs, Col.

The best way to tell how much the bore and valve ports can be increased is to size up the block and see how much stock there is around these. About ⅛ in. is the maximum amount the valves can be rebored, while $\frac{1}{16}$ in. is about all that can be taken from the cylinder bores. It is hard to say just how much additional power you may expect from this, as so much depends upon carburetion, valve timing, ignition, etc. We believe you will get just as good results by increasing the size of the valves and ports only, leaving the cylinder bores as they are. This results in better volumetric efficiency.

Size of Racing Engines

Q.—What is the size of some of the larger engines in the larger racing cars? Can they get more speed out of larger engines and larger racing cars? What is the size of the engine used in Packard racing cars?—Cleary Brothers, Crosby, N. D.

Practically all the racing cars competing on American speedways come within the 300-cu. in. piston displacement limit. This means that there is not much difference in the size of the cylinders. For instance the Duesenberg car raced last year by Milton and Henderson had cylinders 3.75 by 6.75 in., giving a piston displacement of 299.0 cu. in., while the Frontenac cars had engines 3.87 by 6.37 in., giving them a displacement of 298 in. De Palma's Packard equipped with twelve cylinders had a bore of 2.625 in. and stroke of 4.50, giving a displacement of 299.0 cu. in. Thus you see the engines are all of about the same cubic capacity. Cars of larger displacement than 300 cu. in. must compete in special events.

Engine Carbons Badly

Q.—I have a Chevrolet 490 that carbonizes badly in 250 miles of driving after cleaning. Does a valve-in-head engine carbonize more quickly than an L-head type?—Fred Longren, Mancelona, Mich.

The amount of carbon deposit in any engine depends upon the severity of service and the quality and quantity of gasoline or oil used. Also if the spark is not hot enough to fully ignite the mixture at all times the cylinders, pistons, etc., soon become fouled with carbon. Leaky pistons and rings will do the same thing.

TO assist readers in obtaining as a unit all information contained in this department on a certain subject in which they may be most interested, such as ignition, carburetion, etc., MOTOR AGE has segregated inquiries into classes of allied nature. Questions pertaining to engines will be answered under that head, and so on.

THE ELECTRIC SYSTEM

Theodore F. Poetz.....New York
J. L. Horner.....Clinton, Ind.
F. C. Heintz.....Hewitt, Wis.
H. T. Woita.....Little Rock, Ark.

ENGINES

T. A. Grass.....Chicago
C. S. Sorensen.....Chicago
J. C. Smith.....Camp Hill, Ala.
J. P. Klein.....Idaho Springs, Col.
Cleary Brothers.....Crosby, N. Y.
R. N. Davis.....Springfield, Ill.
Fred Longren.....Mancelona, Mich.
A. Sneen.....Leland, Iowa
Neil C. Ensworth.....Warren, Pa.
Vergil Peck.....North Platte, Neb.
H. A. Brooks.....North Platte, Neb.
F. T. Sergent.....Belvidere, Ill.

MISCELLANEOUS

W. A. Siler.....Palouse, Wash.
N. E. Ensworth.....Warren, Pa.
George Smith.....Newburg, Iowa
Cecil C. Camp.....Texas City, Ill.
F. T. Sergent.....Belvidere, Ill.
Cleary Brothers.....Crosby, N. D
W. McFall.....Lovilia, Iowa
J. D. Flaig.....Des Moines, Iowa
W. T. Rice.....Waukegan, Ill.
P. Asquini.....Chicago
Frank Luton.....Richmond, Ind.
Lee Lewis.....Garwin, Iowa
W. E. King.....Manito, Ill.

LUBRICATION

C. A. Johnston.....Ashtabula, Ohio
C. W. Bigelow.....Ithaca, N. Y

CARBURETION

Theodore F. Poetz.....New York
Neil C. Ensworth.....Warren, Pa.

REBUILDING

C. A. Johnston.....Ashtabula, Ohio
Reader.....Ritzville, Wash.

No communication not signed by the writer's name and address will be answered in these columns.

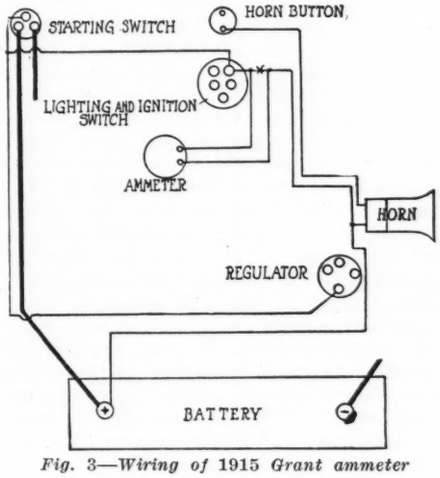


Fig. 3—Wiring of 1915 Grant ammeter

Timing Marathon Engine

Q.—Give information as to how to time the engine of a 1915 Marathon after replacing the crankshaft.—R. N. Davis, Springfield, Ill.

On this engine the intake valve opens 12 deg. after top dead-center and closes 45 deg. after bottom center. The exhaust opens 46 deg. before bottom dead-center and closes 7 deg. after top dead-center.

Interrupter Points Adjustment

Q.—What is the correct opening of the points of the different magnetos and distributor ignition system?—A. Sneen, Leland, Iowa.

This adjustment varies with the different makes of instruments, but as a general thing the points should open not much over $\frac{1}{64}$ in. Most makers supply a thickness gage with their magnetos or distributers which is the correct adjustment. If an engine misses at high speed it is frequently a sign that the points open too far. If it misses more at low speed the points should be made to open a little more.

Two Plugs in Cylinder

Q.—Would it increase the power and reduce gasoline consumption to place two plugs in each cylinder? I have a 1913 Oakland that has an L-head engine with the spark plugs over the intake valves. Holes over each cylinder are already drilled and threaded. These holes now are plugged with a solid iron plug and as a spark plug will fit the same threads it wouldn't cost anything to try it. However, I don't believe that an ordinary spark plug would work with just a wire running from the original spark plug over to the new one. I have noticed a special plug advertised, called the Sudig, that is supposed to be made for this.—Neil C. Ensworth, Warren, Pa.

According to the makers of the Sudig series plug it is beneficial to install two plugs in this engine. It will not cost a great deal to try out the experiment and even if you gain only a little it is better than only one plug. An ordinary plug would not do, for the spark would occur in the first one only. The plug must have two terminals on it for connections, as in the Sudig.

Stutz Engine for Racing

Q.—Is the present Stutz 4 3/8 by 6 sixteen-valve engine, what make I do not know, good for high-speed racing? What gear ratio is the highest it can be given and what changes would you make in the car?—Vergil Peck, North Platte, Neb.

The engine used in the Stutz car is a sixteen-valve Wisconsin. It has been used for racing purposes for years. The sixteen-valve job is as good for this as the conven-

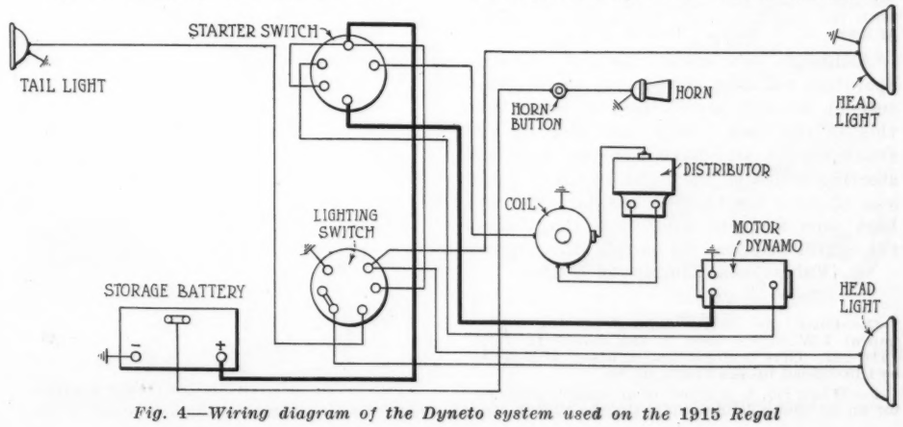


Fig. 4—Wiring diagram of the Dyneto system used on the 1915 Regal

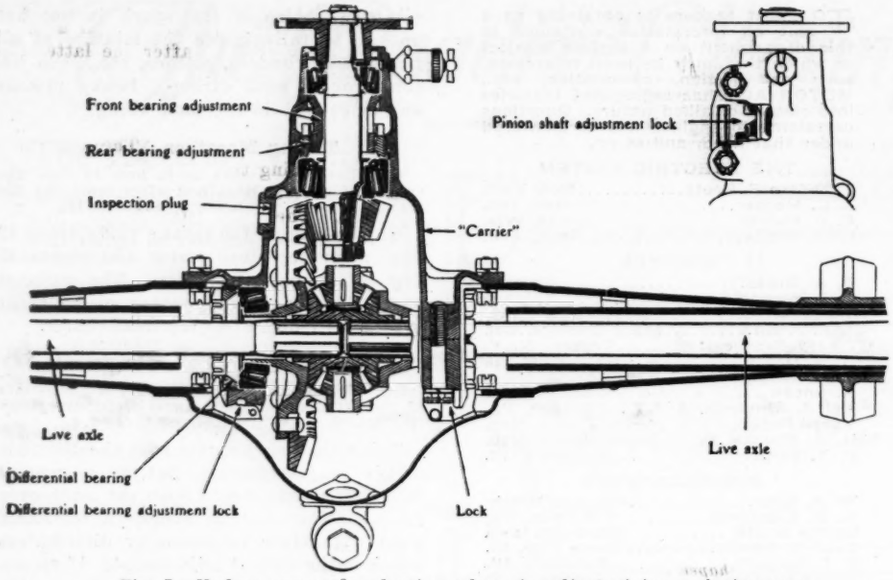


Fig. 5—Hudson rear axle, showing where to adjust pinion and ring gear

tional eight-valve engine. It is hard to say off hand what gear ratio to use or how to build the car, as it depends a great deal whether the car is to be used on speedways or dirt tracks. Gear ratios are changed frequently on racing cars to conform to different tracks in the country.

Engine Has Piston Slap

Q.—I have a 1916 Glide car with the 1917 engine in it, which has developed a piston slap. Would you advise reboring and equipping with aluminum pistons and some kind of non-leaking ring?—H. A. Brooks, North Platte, Neb.

Light-weight pistons give very good results when properly fitted and when the engine is not too old. The best way to get them right is to send the makers one of the old pistons and tell him you wish to substitute for it an aluminum piston. He will then be able to send you a set having the proper clearance. Before putting in the pistons the block must be rebored and ground if possible. A good ring designed to prevent leakage is an asset to any engine, especially if the engine is in the habit of splashing oil into the combustion chamber.

Engine Slows Downs

Q.—What will cause the engine in Hudson car of 1914 and 1915 to slow down and sometimes stop when the car is turned sharply to the left as in turning around in a street? When turning to the right, the engine generally will speed up. I have been told that these conditions were caused by the throttle rod binding in the steering column, but it cannot be this for the foot throttle is used, and even if the rod did bind in the column and turn to the left with the wheel, it would feed more gas instead of less.—F. T. Sergent, Belvidere, Ill.

Although you state that the throttle operating rod does not bind in the steering column, we still are inclined to think that this is the case. Why not jack up the front wheels and have someone turn the steering wheel to the right and left, while you observe the throttle action. You can then soon find out what it is that causes the engine to speed up or fall off.

Valves and Timing of Velie

Q.—Give the valve timing of the Continental 7-W engine used in the model 22 Velie, 1916 car. Give ignition timing also. If this can be illustrated by drawings, do so.

2—When No. 1 cylinder is on upper dead center on its firing stroke and with the timber completely retarded, what must be the position of the contact points?—W. E. King, Manito, Ill.

1—The proper position of the valves is indicated on the rim of the flywheel by symbols such as 1-0 3-4, meaning that the inlet valves of cylinder 3 and 4 open when the marks are on top deal center. The marks D C 1-2 means cylinders 1 and 2 are on top dead center. The exhaust valves are indicated by the letter E, as EC 3-4, meaning exhaust valves of cylinders 3 and 4 are closing. In this particular engine the intake valve opens on top dead center and closes 33 deg. late. The exhaust valves open 67 deg. early and close on center.

2—The contact points of the magneto should just begin to separate. A better way sometimes to time an engine, in regarsd to the ignition, is to place the piston about ¼ in. past top dead center on the compression stroke, or what is in reality the firing stroke, then advance the housing o fthe interrupter as far as it will go. The sliding block that separates the points should just be coming into contact with one of the cams in the interrupter housing, making sure that the distributer brush is on No. 1 segment, which is wired to No. 1 plug. This gives you plenty of leeway for retarding the spark. On some engines it is possible to place the piston farther down in the cylinder, say about ⅜ in. Engines sometimes are timed by placing the spark advance lever just half way on its quadrant, then bringing the piston to top dead center, with the points just about to break.

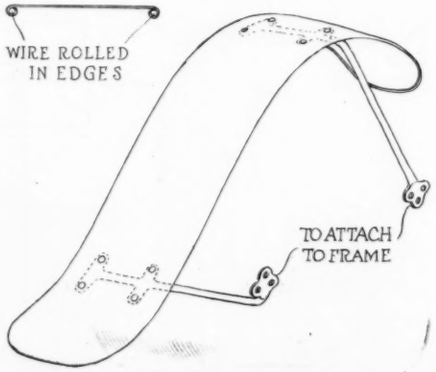


Fig. 6—Suggestion for individual fenders for speedster types with no runningboards

Miscellaneous

Exhaust Heater on Chevrolet

Q.—Will you show by diagram how to install an exhaust heater on my 1916 Baby Grand Chevrolet? Would an auxiliary air valve or manifold and using steam from radiator help to get more mileage? Is a vacuum system better than an air pressure for gasoline systems? Who makes the Wilgo Gas Saver valve?—W. A. Siler, Palouse, Wash.

A suggestion for making an exhaust heating device for warming the air going to the carbureter is shown in Fig. 9. It consists essentially of a drum made of sheet metal supported on two wooden ends, protected properly by asbestos.

We suggest that you refer back to previous issues of MOTOR AGE and read some of the Experience Meetings, wherein other owners state their views of auxiliary air devices, water injection, etc. Many of these owners have rigged up devices of their own and the majority seem to be of the opinion that auxiliary air devices do increase the mileage.

The vacuum system is used on the vast majority of cars at the present time and is simpler than the pressure type feed, inasmuch as no air-tight tanks are necessary and other things, such as air gages, pumps, etc., are done away with.

The Wilgo Gas Saver is made by the E-Sen-Shal Mfg. Co., 1420 Dime Bank Building, Chicago.

Vibration with Disk Wheels

Q.—Will the new style disk wheels have a tendency to give the car more vibrations and road shocks than a wood wheel, or can this be overcome by proper dishing of the wheel and placing the rim off center?—N. C. Ensworth, Warren, Pa.

Vibration is overcome in these wheels by proper dishing. In fact some of these wheels are so constructed that there is actually a slight spring action. This is true mostly of disk wheel having two cone-shaped surfaces bolted together.

Removing Detroiter Wheel

Q.—Explain how to take the rear wheel off of a Detroiter car.—George Smith, Newburg, Iowa.

You do not specify the model of your car, but on the 6-45 the rear wheels are mounted on the taper ends of the driveshafts and held in place by a key and nut. The latter must be removed and the wheel can be taken off by a wheel puller. Sometimes tapping the end of the axle shaft lightly with a hammer will assist in getting the wheel off.

Adjusting Hudson Rear Axle

Q.—Publish diagram and instructions for adjusting the pinion and bevel gear in the full-floating rear axle of the Hudson 6-40, 1914 model.—F. T. Sergent, Belvidere, Ill.

Before attempting any adjustments remove the inspection plug at the left side of the gearcase and differential carrier. See that the back face of the teeth on both the pinion and ring gear are flush. The pinion adjustment can be reached by first removing the pinion adjustment lock, held in place by two bolts on top of the carrier. End play in the pinion shaft should be taken up by turning the front bearing adjustment to the left, when looking at the axle from the front end. This is the inner nut. The outer nut, which is for the rear

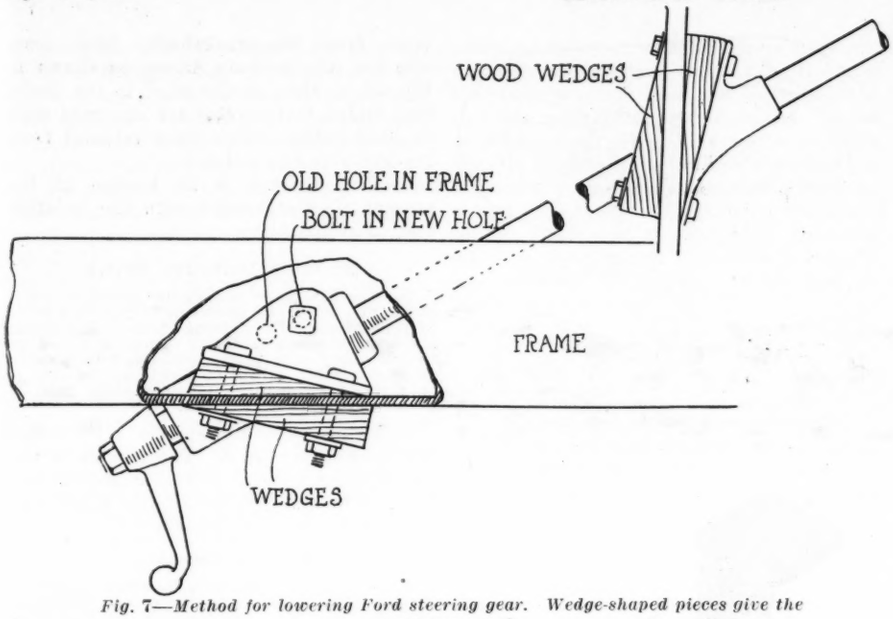


Fig. 7—Method for lowering Ford steering gear. Wedge-shaped pieces give the necessary angle

bearing adjustment, should be held against movement during this operation. Take up play between the bearings until there is no end motion, but do not bind or cause the shaft to turn too hard. Line up slots in both adjustment nuts, then turn both toward the right to bring pinion deeper into mesh with the ring gear, or toward left to withdraw. The proper amount of backlash between the teeth of the ring gear and pinion is from .006 to .008 in.

If both gears are flush and there is too much backlash or too little, the ring gear may be adjusted either in or out to remedy this condition. The adjustments should be made as follows: Remove the differential cover plate on the rear axle housing. Take off the differential bearing adjustment locks and back off slightly the bolt holding the bearing caps in place, so that the adjusting nut can be turned easily. Only loosen it a very little, as the threads on these caps will become cross-threaded if the bolts are backed out too much. To move the gear toward the right, back off the right-hand adjusting nut one or two notches at a time and take up the same number of turns on the left-hand nut. If the gear wants to go the other way, reverse the operation. Take side play out of the bearings by these nuts. When you have the proper adjustment tighten the bearing caps and see that the locks are put in place again.

Wants Ford Radiators

Q.—Would you give us the names and addresses of manufacturers who make radiators for Ford cars?

2—Please give us a description of individual fenders for Ford raceabout or truck, light and strong, and what kind of material to use, not using any runningboard, or name and address of anyone making them.

3—Do they make disk wheels for Fords?

4—Give us some description of Ford raceabouts with steering wheel lowered, short one-piece windshield, hood and cowl, high radiator, etc.—Cleary Brothers, Crosby, N. D.

1—The following concerns manufacture radiators for the Ford car: Detroit Radiator & Specialty Co., Detroit; Wright Cooler & Hood Co., Chicago; and the National Can Co., Detroit. Most of the concerns specializing in speedster bodies, etc., for Fords also furnish radiators with their

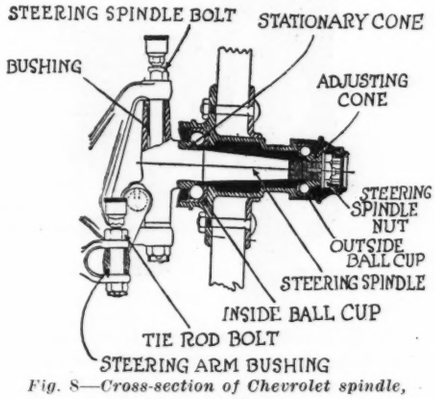


Fig. 8—Cross-section of Chevrolet spindle, showing adjusting cone

equipment. Many of these appear in the advertising columns of MOTOR AGE.

2—There are so many styles of fenders for speedster bodies that it is hard to describe any particular one. If no aprons are desired with the fenders, the job of making becomes comparatively simple. As a general thing two brackets are required for each fender inasmuch as runningboards are dispensed with. A simple type of fender is shown in Fig. 6. The hardest thing to contend with is finishing the edges. One way of doing this is to roll a $\frac{3}{16}$-in. wire under the metal after the latter has been bent under. This is a job for a tinsmith or sheet metal worker, as the average owner or repairman is not equipped with the proper tools for this. There are machines for doing this, but the bends are so sharp that most of the work has to be done by hand. The best metal to use for them is leaded steel, about 22 or 24 gage.

Fenders of this type sometimes are furnished with speedster designs, and some of the makers specializing in these bodies may be able to supply such. We suggest that you write to the following makers: Lehman Mfg. Co., Cannelton, Ind.; Peoria Acessories Co., Peoria, Ill.; Auto Remodeling Works, Chicago; and Auto Sheet Metal Co., Chicago.

3—Disk wheels for Ford cars are made by the following concerns: Charles Schutte Body Co., Lancaster, Pa.; W. G. Stuart, 814 Marquette building, Detroit; and Erickson & Johnson, Chicago.

4—Various suggestions for building Ford speedsters have appeared from time to time in the Readers' Clearing House, and a method for lowering the steering column is shown in Fig. 7.

Wants Dimmer Experiences

Texas City, Ill.—Editor MOTOR AGE—As the problem of lights and lighting is affecting more or less every owner of a car more than a year old, I would be glad to have the experiences of others with the use of the different methods of trying to overcome the glare of the headlights and still have adequate light for all occasions discussed in your Experience column of the Readers' Clearing House.

The law as you know now requires that the glare be eliminated in passing, but from what I can hear from others I do not think that either the dimmer headlight or some of the lens at least are the proper solution of this problem.—Cecil C. Camp.

Has Pocketed Valve

Q.—I have a Ford car which does not fire well on No. 2 cylinder. The valve seats have been reseated in this cylinder and I think have been cut too deep. If that is the case, what would be the remedy? Valve springs are all right and valve stems and pushrods have the proper clearance, but the valve does not seem to seat well after repeated grindings.—W. McFall, Lovilia, Iowa.

Your engine has what is commonly called

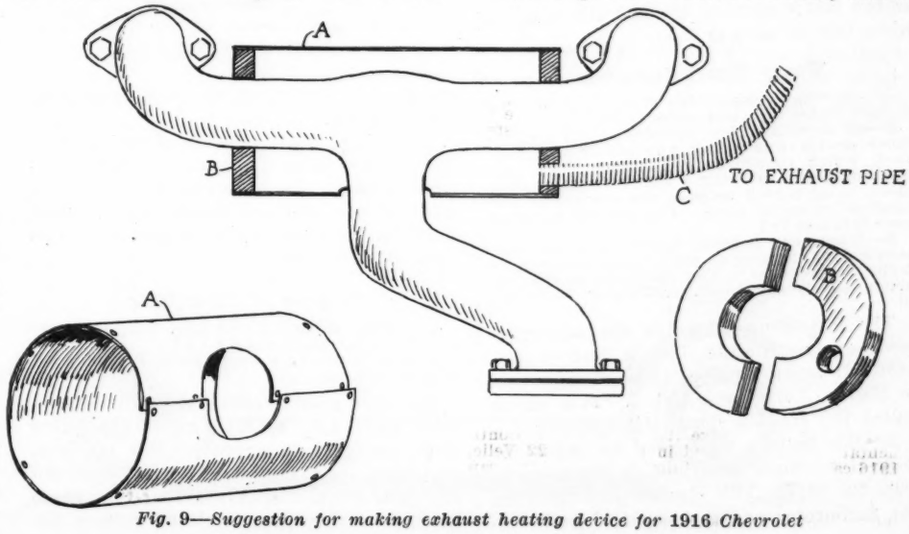


Fig. 9—Suggestion for making exhaust heating device for 1916 Chevrolet

a pocketed valve, that is, the valve seats too far down in the block. The result is that the gases do not have the same chance in this cylinder as in the others. A remedy would be to cut away some of the metal under the seat, thus narrowing the seat somewhat. This gives an increased opening, even with the valve lower than the rest.

Front Wheels Wobble

Q.—What makes the front wheels wobble when they seem to be tight and all O. K.? They will wobble until they swing the front end of the car when I drive at the rate of 25 m. p. h. —Fred Longren, Mancelona, Mich.

Improper adjustment of the cones, worn steering spindle bushings or loose bolts in hub and spokes could make the front wheels wobble. To test for worn bushings jack up the wheels and grasp the top and bottom spokes, at the same time giving the wheel a pull toward you. If the spindle body has considerable movement or shake in it, the bushings need replacement. Or, the ball races may be damaged and several of the balls themselves broken. If the wheels need only adjustment, proceed as follows. Spin the wheel and at the same time screw the adjusting cone up until it is tight enough to stop the rotation of the wheel. Then back off on the cone just enough to allow the wheel to spin. Draw the nut up against the cone and put the cotter pin in place. A sectional view of this spindle is shown in Fig. 8.

Wants Cyclecar Pictures

Q.—Please publish side views of cyclecars 16 or 8 in. as published in Feb. 14, page 21, in start of cyclecar race. Please give wheelbase, horsepower and make of car.—J. D. Flaig, Des Moines, Iowa.

MOTOR AGE has no pictures available of these cars at the present time, showing a side view. Should we be able to get these we shall publish them in the Readers' Clearing House.

Graphite on Tubes

Q.—Is there any material advantage in using graphite on tubes? Does graphite interfere with vulcanizing or putting on patches?—W. T. Rice, Waukegan, Ill.

Graphite is used quite extensively on some racing cars for lubricating the tubes. There is no material harm in using graphite in this way and some owners think the practice superior to talc or mica. Others hold the opposite view. According to the makers graphite does not interfere with vulcanizing or patching the tube, inasmuch as the latter must be cleaned the same as when talc or mica is used.

Wants Tire Information

Q.—In what issue of the Motor Age was the Hudson Super tire last advertised?

2—At some time last summer or fall a water vapor device was either announced or advertised, which consisted of a simple thick gasket type plate, carrying a small jet and needle valve, to be placed between the carbureter and manifold or engine block. Can you tell me what issue this was in?

3—Where can a small needle valve and perhaps a float chamber to construct a water vapor device be procured? The needle valve must be comparatively small.—F. T. Sergent, Belvidere, Ill.

The last issue in which the advertisement of the Hudson Tire & Rubber Co., 1436 Michigan avenue, Chicago, appeared in MOTOR AGE was March 7. This tire is called the Hudson Super-Mileage tire.

2—We believe you have in mind the Z-Ro-Hot primer described in the issue of Oct. 22, 1917. This device goes between the carbureter and the manifold and electrically heats the gasoline used for priming the cylinders.

3—It is possible that the float chamber and needle valve from an old carbureter would suffice. These can be obtained from most of the concerns specializing in used parts, or the parts can be bought new from carbureter makers.

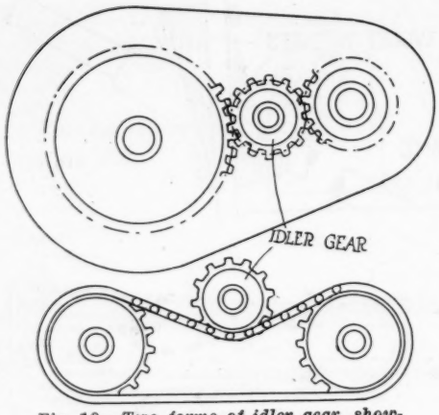


Fig. 10—Two forms of idler gear, showing application also to chain drive

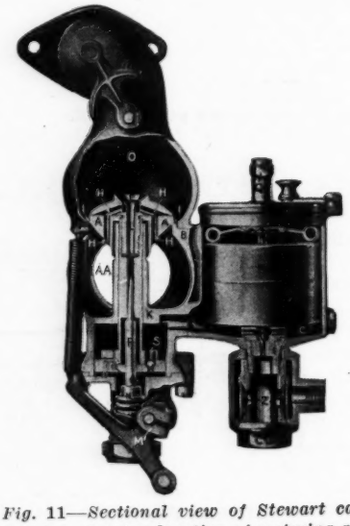


Fig. 11—Sectional view of Stewart carbureter, showing location of metering pin

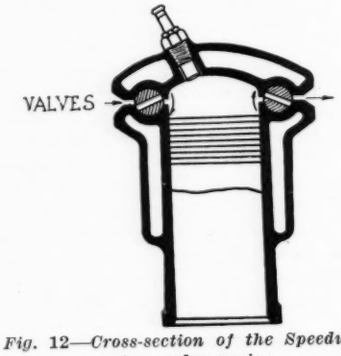


Fig. 12—Cross-section of the Speedwell rotary-valve engine

Purpose of Idler Gear

Q.—What is an idler gear? Where located and for what purposes?

2—Can you tell me where Eddie Rickenbacker is?—P. Asquini.

An idler gear is one that revolves on a stub shaft and simply carries the drive from one gear to another. For instance, and idler gear sometimes is put between the gear on the crankshaft and magneto gear, when the latter is placed quite a distance from the crankshaft. Idler gears also are put in chain drives, as shown in Fig. 10, to take up the slack in the chain. Belt-driven motorcycles are equipped with an idler pulley, which when released from the belt acts like a clutch.

2—Rickenbacker is in Europe at the present time connected with the aviation section of the Army.

Probably Defective Switch

Q.—We have a Westinghouse starting motor of the non-automatic pioion shift type on a piece of apparatus which is giving trouble. The motor will spin when the starting switch is closed on the auxiliary contact, but does not turn when switch is closed to full on position. Battery is O. K. and all wire connections seem tight.—Frank Luton, Richmond, Ind.

As lond as the motor spins at all it shows the fault is not in it. The trouble is undoubtedly due to a defective switch and the only remedy is to take it apart and examine for internal defects.

Axle on Overland

Q.—In MOTOR AGE, Jan. 3, under technical specifications of 1918 passenger cars, Overland cars are listed with three-fourths floating axle. I always supposed these axles were full-floating. Will you inform me through the Readers' Clearing House if I am right or not.—Lee Lewis, Garwin, Iowa.

The rear axle on the 1918 Overland is of the three-quarter floating type. This has been used for the last two years. In 1915 the company used a floating axle.

Lubrication

Engine Uses Too Much Oil

Q.—I have a Paige 4-36, 1914, which runs fine and is in good shape but uses an enormous amount of oil. I had this car factory overhauled last winter, but it did not remedy this. There seems to be quite a lot of oil in the mud pan all the time. I can fill the crankcase until the oil gage shows full and drive 30 miles at a speed of about 30 m. p. h. and the gage will show only about half full. Where do you think the trouble is? The engine carbons quickly. The amount I paid for the overhauling of this car at Detroit would dazzle you. They claimed they rebored cylinders and put in new pistons and rings, but it uses as much oil and carbons as quickly as before. Could I induce them to make this right?—C. A. Johnston, Ashtabula, Ohio.

Among the things that might cause an engine to use an excessive amount of oil are leaky pistons and rings, poor ignition, worn pushrod guides, oil-soaked gaskets, etc. It does not seem possible that the oil should continue to be used in great quantities after new pistons and rings have been fitted, unless the job was poorly carried out. If the rings and pistons have been given too much clearance, naturally much oil would get past the rings and into the combustion chambers. This is not always the reason for excessive carbon, as too rich a mixture will cause the same thing. We would suggest that you examine the joints of the crankcase and see if oil leaks badly around them. The remedy is to make new ones, either of felt or paper, using shellac on one side. Then draw the bolts up tight.

The pushrod guides are often the greatest offenders when an engine requires a great quantity of oil. A remedy sometimes is afforded by cutting an annular groove around the pushrod near the top and a longitudinal one leading down from it.

Oiling Rotary Valves

Q.—Show how the rotary valves of the old Speedwell and Henderson engines were lubricated. Are these types satisfactory? If so, why are they not used more in present-day construction?—C. W. Bigelow, Ithaca, N. Y.

The early forms of the Speedwell rotary

valve engine were lubricated by putting the oil in the gasoline. Five per cent by volume of oil was introduced into the fuel under ordinary conditions. Several advantages were claimed for this method. The oil was fed into the cylinders and covered all surfaces with a thin film of oil at every complete cycle of the engine. This film of oil was said to be in direct proportion to the number of heat units introduced into the engine and was replenished in infinitesimal quantities at each successive stroke.

Later the valves were grooved longitudinally, the latter assisting in distributing the oil. A double oil pump forced the oil directly to the valves so the operation of these was in a film of oil. Fig. 12 shows a cross-sectional view of the engine with the positions of the valves indicated.

One of the chief difficulties with the rotary valve engine was the lubrication of the valves. Also the valves required very careful fitting and sometimes they warped considerably on account of the heat. The fact that the poppet-valve type of engine is much easier to manufacture is one reason why its design has a big margin over others.

Carburetion

Adjusting Stewart Carbureter

Q.—I have a 1915 Regal, model D, touring car. The car has a Stewart C 25 carbureter on it. Tell me how to adjust it so as to get the most miles per gallon and also how to get the highest speed.—Theodore F. Poetz, New York.

The carbureter is exceedingly simple and there is but one point where any change in the adjustment is possible. This usually is made at the factory. No change should be made unless it is known absolutely that the adjustment is incorrect. The only change of adjustment is that of the relative height of the metering pin to the opening of the aspirating tube.

The metering pin is subject to control from the dash by the rack N and the pinion M, Fig. 11. To change the fixed running position of the pin turn the stop screw to the right or left. Turning this screw to the right lowers the pin and to the left raises it. As the pin is lowered more gasoline is admitted to the aspirating tube at a given engine speed, thus enriching the mixture.

A wider range of adjustment may be had by releasing the clamp of the pinionshaft lever and changing its position with relation to the shaft. This adjustment, however, should not be attempted by the layman. Make all the adjustments with the dash adjustment all the way in.

In adjusting this carbureter it is well to have in mind the action of it, which is as follows: The suction created by the piston draws air into the mixing chamber through the air ducts, H-H. The same suction draws a fine spray of gasoline through the aspirating tube L, into the same compartment and the air, becoming impregnated with the gasoline vapor thus produced, becomes an explosive gas. In order that the proportion of air and gasoline may be correct for all engine speeds the valve A automatically takes care of both air and gasoline at high speeds. The ducts are open all the time, but valve A is held to its seat by its weight until the suction is sufficient to lift it, thus letting in more air. The valve A is joined to the tube L, hence the latter is raised when the valve is lifted and the ingress of proportionately larger quantities of gasoline is made possible. This is accomplished by the metering pin P, normally stationary, projecting into the tube L. The higher the tube rises the smaller the section of the metering pin, even with its opening and hence the greater is the quantity of gasoline which may be taken into the tube.

Shortening Manifold

Q.—Would it increase the power and lower the gasoline consumption on the older models of cars if the manifolds were shortened? You have probably noticed that some cars could easily spare at least 4 to 6 in. and thus bring the carbureter up out of the sod pan.—Neil C. Ensworth, Warren, Pa.

It is absolutely beneficial to bring up the carbureter as high on the cylinder block as conditions will allow. It prevents condensation and gives all-around better engine performance.

Rebuilding

Paige 36 Speedster

Q.—Show diagram of Paige 4-36 touring, cut down to speedster. Give gear ratio.—C. A. Johnston, Ashtabula, Ohio.

A suggestion for this car cut down into a speedster is shown in Fig. 13. Gear ratio is a matter of experiment, usually, depending on conditions. Good results are possible with a reduction of about 3.5 to 1.

Rebuilding Parry for Speed

Q.—I am rebuilding a Parry, which has a 1917 high-speed valve-in-head engine of 3¾ bore and 6¾ stroke. Will this engine go under the 300 cu. in. classification? How fast will this engine go if I put in a racing camshaft, if she does 3,500 per minute? We recut all bearings and she will run for 3 hrs. at 3,000 r.p.m. We put in an extra supply of oil by a pump and an extra oil tank. What do you think of boring holes in the aluminum piston?
2—Where can I obtain a frame like the one used in the Stutz car?
3—Would you undersling or oversling the springs on the rear? I have a spring which is 56 in. long for the rear and 36 in. for front. The springs are almost flat.
4—Where can I obtain Rudge-Whitworth wheels?
5—Would you cut the wheelbase from 116 in. to 105 in.?
6—Would you put in larger valves? The present are 2½ in. in diameter.
7—Would you change the wheel size 34 by 4 to 32 x 4½ in.?
8—We can make this car go around 80 m. p. h. on a prairie. How can I make it go faster? The gear ratio is 3 to 1.—Reader, Ritzville, Wash.

1—This engine will be in the 30-cu. in. class, as the displacement is 298 in. It is very difficult to give an estimate of engine revolution when such parts as the camshaft are changed. Such things are open to experiment and what works well on one may be a hindrance on another. We believe that you are getting plenty of engine revolutions as it is, and it may be well for you to confine your attentions to other parts of the chassis.

There should be no need for boring holes in the aluminum pistons, unless you mean very small ones for conducting the oil into the crankcase. The way to do this is to cut grooves ¼ in. apart all the way up the piston, making the grooves $\frac{1}{16}$ in. wide and about $\frac{1}{64}$ in. deep. Then drill tiny holes in these grooves about ⅜ in. apart, slanting them downward slightly. This helps in getting the excess oil back into the crankcase.

2—The frame used in the Stutz car is made by the A. O. Smith Co., Milwaukee, Wis.

3—Always get the weight down as low as is possible and consistent with good design. If you can conveniently undersling the springs, do so, but if a better mechanical job will result by putting them above the axles, this will be far better.

4—Rudge-Whitworth wire wheels can be obtained from the Wire Wheel Corp. of America.

5—Yes.

6—We should not advise larger valves as the danger of warping becomes too great. Smaller valves and more of them seems to be the solution.

7—In the long run believe you would get better results with the smaller size tire.

8—Eighty miles per hour seems pretty good to us for a rebuilt car. More speed may be possible by changing the valve timing slightly, larger carbureter, provided the valves can take care of the additional volume of gas, double ignition, if this is possible, changing the gear ratio to 2⅞ to 1 or about such a figure. Much experiment is necessary on cars intended for fast work and the only way to find out whether or not it will be beneficial to make changes here and there is to change the installation or construction and note the results.

Weight of Buick 37

Q.—I would like to know the weight and the piston displacement of the Buick 37, and what can be done to make it real fast?—Frank Kuehn, Arlington, S. D.

According to the local branch the weight of this car is about 2400 lb. The engine has a bore and stroke of 3¾ by 5 in., thus giving it a piston displacement of 242.9 cu. in.

If you want to rebuild for speed, enlarge the valves, advance the ignition, fit larger carbureter, lighten the body and change the rear axle gear ratio. A special racing camshaft also may help.

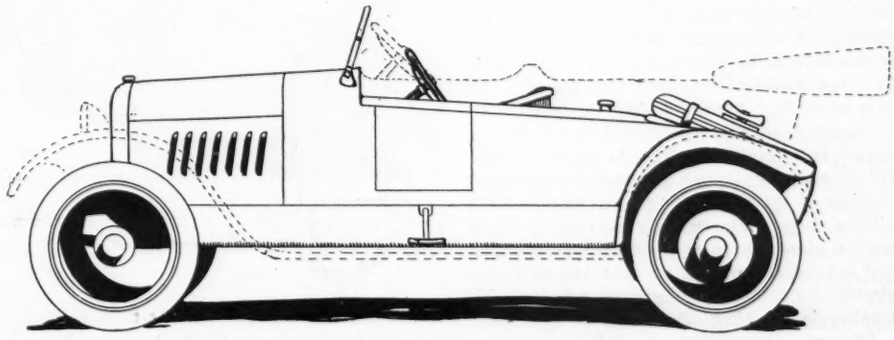


Fig. 13—Suggestion for converting Paige touring car into speedster

New Case Kerosene-Burning Tractor

Thermostat, Air Washer and New Frame Construction Among Distinctive Features of Type B

DURING the last two years the J. I. Case T. M. Co., Racine, Wis., has been quietly developing a new kerosene-burning two-plow tractor. This tractor, on which quantity production is now under way and on which delivery was begun last week, is not an addition to the Case line but will replace the already well established type A 9-18. The new machine will be known as the Case type B 9-18 and will sell for $1,225, the same as the old machine, but it shows a distinct advance in design and construction over the type A. It has special features, some of which will be found on no other tractor on the market and is in every way a more dependable and practical machine than the one it displaces. The new model has been under actual field tests in all sorts of conditions and in all climates for the last two years.

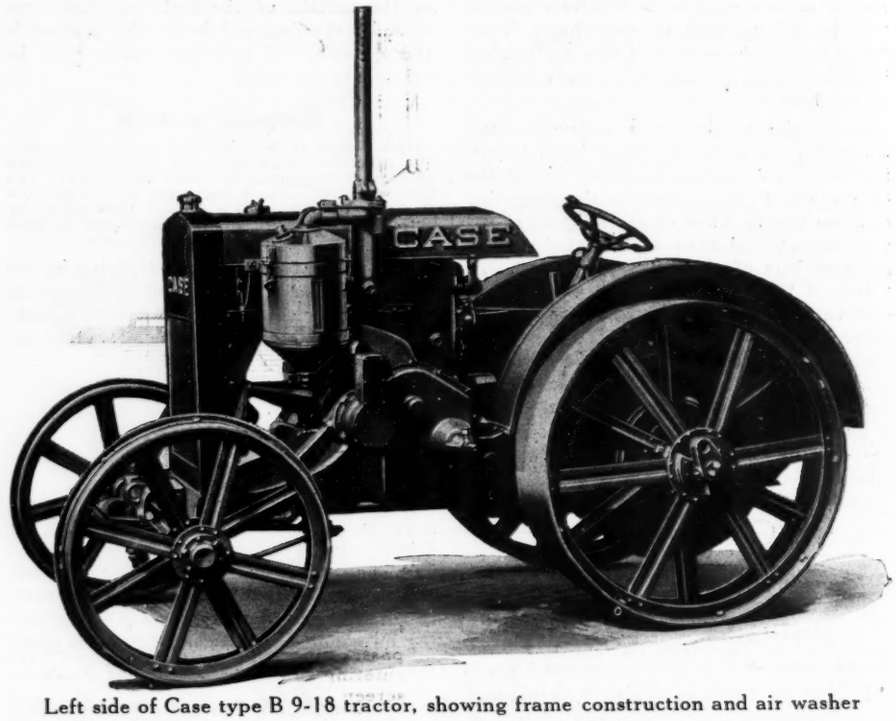
Some of the new features which mark advance in tractor construction are the Sylphon thermostat, the improved air washer, the new frame construction, giving a shorter wheelbase and greater rigidity, and the reduced weight with increased drawbar pull.

The Thermostat

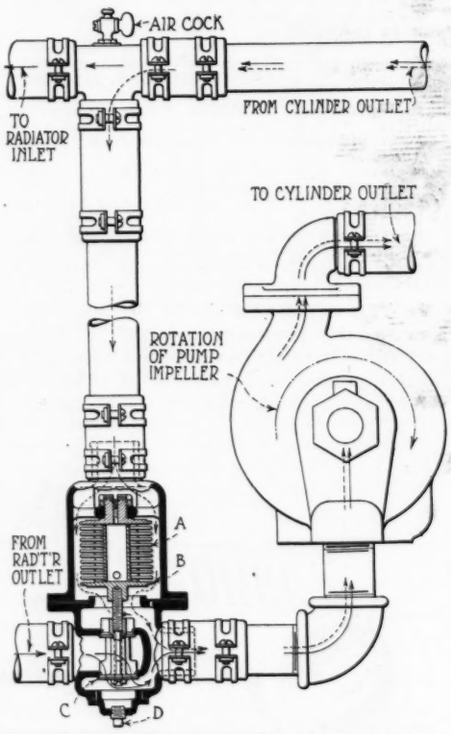
The Sylphon thermostat is a feature possessed by no other tractor on the market. It controls the circulation of the cooling system, and the manner of installation is shown in the illustration of the engine and radiator. Through the automatic operation of the thermostat the engine cylinder is kept hot, thereby improving combustion and preventing raw kerosene from passing the pistons and diluting the oil in the crankcase. The illustration shows the internal construction and manner of operation of the thermostat. The radiator illustrated is not the type which will be used regularly. The standard radiator has a new reservoir, with cast top, bottom and sides, and can be disassembled easily and readily at any time by taking out a few bolts.

On the opposite, or right side, of the tractor is installed an improved type of air washer which is of the company's own design. This is of the water chamber and float type but differs from similar washers by the interposition of screens through which the air must pass on its way to the manifold. The screen used is of 32 gage and the location is shown in the illustration. It is claimed that by passing the air through a screen just before it enters the water it is so broken up that it cannot pass in large bubbles or carry any quantity of dirt with it. After passing the water the air must penetrate another screen before it enters the manifold. This is to insure perfectly clean and pure air and thus prevent scoring of the cylinders and wearing of the piston rings. The washer also is equipped with a glass water gage, showing high and low marks for water, so that the operator always can tell at a glance whether his washer is working effectively.

The wheelbase of the type B has been so shortened that the turning radius has been reduced from 14½ to 11 ft. The construction of the main frame has been simplified and the engine is so mounted that factory production is accelerated and facilitated.



Left side of Case type B 9-18 tractor, showing frame construction and air washer



Detail of design of Sylphon thermostat used on Case 9-18 tractor

In simplifying the frame construction a heavily ribbed design has been adopted, which provides for great strength and rigidity and which reduces vibration to a degree never attained in the old type A machine. The dust-proof housing for the rear axle and the dust-proof container for the bull pinion shaft and crankcase are cast integral with the main frame to insure perfect lubrication at all times.

Strength in Wheels

The wheels, both drive and front, are a concession to farmer preference. It has been found difficult at times in the past to convince the farmer of the real strength of the suspended type of wheel. He much preferred to have something which had the obvious appearance of strength and rigidity. To meet this preference the Case people adopted the wheel which appears on the type B. To give both the appearance and the actuality of strength the drive wheels have angle iron felloes riveted to the 9-in. tires. Ribbed flat steel spokes are double riveted to the felloe at one end and at the other are riveted four times to the hub flange. The front wheels are of similar construction.

The weight of the type B tractor has been reduced from 3750 lb. to 3310 lb. and is distributed 68 per cent on the drive wheels and 32 per cent on the front wheels. The engine speed has been increased to a normal of 1050 r.p.m. The new machine is rated conservatively at 9 hp. drawbar and 18 hp. belt, the same as type A. However, the type B will develop 12 hp. on the drawbar, thus providing a reserve power of 33⅓ per cent for emergency pulls. This

reserve enables the type B to pull two 14-in. bottoms to any desired depth and through any kind of soil and up any degree of grade where a team can pull a single 14-in. bottom. Nor with so large a margin of reserve power is the tractor likely to be overloaded often, thus insuring prolonged life and satisfactory service.

Detailed specifications of the Case 9-18 type B tractor are as follows:

Engine—Case, 3⅞ by 5, four-cylinder, vertical, cast in block, transversely placed on main frame, valve in head, head removable. Diameter of valves 1½ in. Fuel feed by gravity through Kingston 1⅛ in. carbureter and heated manifold. Air washer. Engine speed normal at 1050 r.p.m, controlled by fly-ball governor. Diameter of belt pulley 14¼ in., face 5¼ in., fitted with clutch and brake.

Ignition—Dust proof Kingston high-tension magneto with impulse starting coupling. No batteries required.

Cooling system—Capacity 9 gal. Truck-type radiator and fan, centrifugal pump, circulation controlled by Sylphon thermostat.

Lubrication—Circulation and splash, aided by plunger pump.

Transmission—Sliding gear, two speeds forward and reverse. All steel gears, teeth cut and hardened, fully inclosed and running in oil.

Traction speed—Plowing speed, 2½ m.p.h.; road speed, 3½ m.p.h.

Final drive—Drop forged and hardened spur pinion meshing with steel master gear of 2⅛ in. face, having teeth cut and hardened. This gear is mounted on drop-forged bull ring, securely fastened to the spider carrying four steel differential pinions. All these parts are inclosed in dust-proof housings.

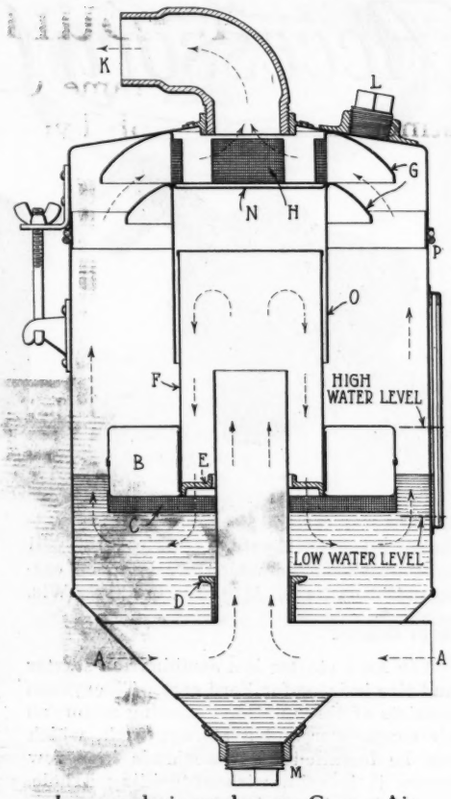
Bearings—Hyatt roller bearings for rear axle, transmission and bull pinion shaft. Front wheels have removable bushings in dust-proof hubs fitted with grease cups. Crankshaft has babbitted main bearing. Connecting rods have die-cast, bronze-backed bearings for crank pins and solid bronze bushings for piston pins.

Front axle—Motor car type steering gear.

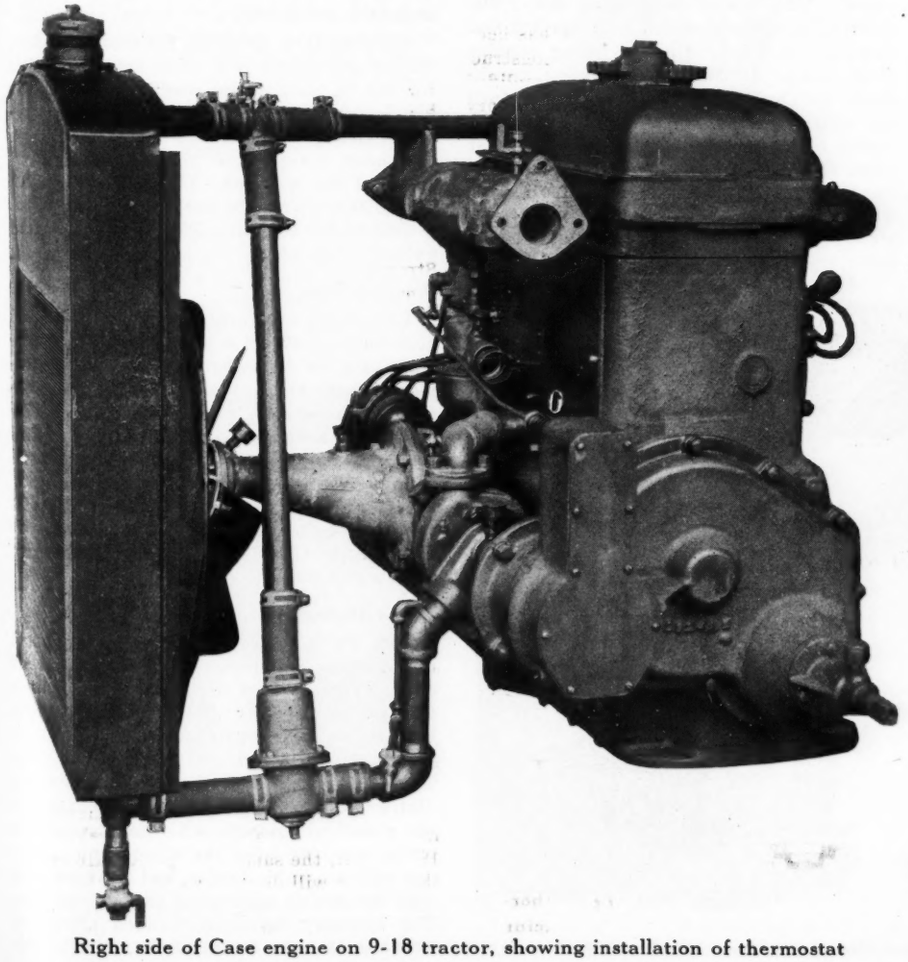
Wheels—Drivers, 42 in. in diameter, 9 in. face, 6-in. extension rims on special order at extra price. Rims drilled for spade lugs regularly supplied. Front wheels, 30 in. diameter, 6 in. face.

Dimensions—Extreme length, 108 in.; width, 68 in.; height, 58 in.; wheelbase, 63 in.

Capacity—Pulls two 14-in. plows anywhere a team can pull one plow. Will drive a Case 20 by 28 thresher or any other power-driven machine requiring the same belt power.



Improved air washer on Case. Air passes through screen at C before entering water and again through screen at N before entering manifold



Right side of Case engine on 9-18 tractor, showing installation of thermostat

A. A. A. CHEERS UP SOLDIERS

New York, April 12—Easter Sunday for the boys at Camp Upton was the last Sunday in America for many, and the American Automobile Association knew this and fostered a plan to make the day and all succeeding Sundays, a happy one for the soldiers and their relatives. Cars to transport to the camp the mothers, fathers, sisters and brothers of the boys were asked for, and more than eighty responded. About 250 relatives made the trip.

There were fifty-eight starting places in New York and fifty-eight cars. The trip to the camp is about 80 miles and ordinarily would take about 5 hr. The A. A. A., however, realized the value of each additional minute and provided entrance tickets to the Motor Parkway, a stretch of 45 miles of perfectly graded concrete, where there is no speed limit, where they are almost no grade crossings and where there are so few cars than one is never blocked. By using this road, most of the cars were able to arrive at the camp about noon.

The camp streets are a contrast to the fine, clear roads of the Parkway. The soldiers built them and made a pretty good job of it, but the traffic at the camp is heavy. Hundreds of motor trucks run back and forth. There are motorcycles by the thousands, and many of the officers have cars. Camp Upton has everything except traffic policemen, and Sunday a full squad could have been used easily to direct the never-ending stream of vehicles, each piloted by a soldier.

CLUBMEN ENFORCE TRAFFIC RULES

Birmingham, Ala., April 12—Birmingham has adopted a new traffic law and the local police force has been augmented through the addition of 300 volunteer traffic cops to assure the observance of the new regulations. The volunteer policemen are drawn from the membership of the Rotary and Kiwanis clubs, two of the most representative organizations in Alabama.

Safety signals mark the routes to be followed and also the points at which passengers may be taken on or discharged, and the law provides stringent penalties for non-observance. The safety markers, which are equipped with a red flag in the daytime and a red lantern at night, were donated to the city commission by the members of the Rotary and Kiwanis clubs, who were largely responsible for the adoption of the regulations themselves.

STATE APPROVES CONAPHORE

New York, April 13—The New Jersey legislature amended its headlight law at the recent session so that it no longer reads "that all cars in the state of New Jersey should be equipped with two white lights only." This lifts the ban against the Conaphore and other headlights of yellow tint. Commissioner Dill already has issued a certificate of the legality of Conaphores in New Jersey.

The Accessory Corner

Body Fittings

THE Hoof line of commercial car, hearse and ambulance body hardware and fittings include some excellent designs in the way of dome and pillar lamps. Two of the dome lights are illustrated herewith. The maker claims to have the largest stock in the United States and supplies everything used by the motor car trimmer, among its fittings being imported and domestic upholsteries, top and seat cover fabrics and so on.—C. M. Hoof Co., 317 West Randolph street, Chicago.

Left, Standard air brush for washing cars; right, motor dictograph

Safety Taillight

The Safety taillight is, in effect, a combination spotlight and headlight for use in backing a car. It was developed as the result of a car backing over an embankment. It is integral with the red taillight and in no way adds to the number of loose fitments about the car for this reason. The red light is constant at night, and the white light, which throws its ray 50 ft. back of the car and the full width of a road, is controlled from a switch located to suit the convenience of the driver. The searchlight can be turned on or off at will. The lamp is of cold rolled steel finished in baked-on black enamel. Price, $6.—King-Bull Mfg. Co., 123 East Ontario street, Chicago.

Terwedo Mud Shoe

The Terwedo mud shoe is made of steel pressed into shape over a die and has a lifting surface of 7 in. across under the tire and 7 in. the other way. The under side is concave and pushes dirt into the rut and will raise the car out of a rut with each turn of the wheel. The traction flanges are all 7 in. wide and an inch deep. The shoes are attached to the wheels by web straps fitted with patent buckles that will take up slack and which are loosened easily.—Nelson-Bacon Mfg. Co., Oshkosh, Wis.

Aero Starter

The Aero starter is a combination starter and tire inflator for Ford cars. The system consists of three units, a starting motor, an air compressor and a storage tank, which can be installed by a mechanic in a few hours, it is said, without drilling a hole. An air hose is furnished so that a tire can be inflated with cool, clean air from the storage tank. When filling tires, the air hose is connected to the starter control valve. The device weighs 54 lbs. The starting motor is mounted on a bracket and installed on the engine by using regular Ford bolts. It drives the engine crankshaft by chain and sprockets which turn the entire crankshaft through a positive clutch which frees itself from the sprocket when the engine starts, permitting the motor to remain inactive at all times except when starting. In operation compressed air from the storage tank is admitted into the starting motor by an air-control valve attached to the rear of the motor and controlled by a pedal through the floor board of the car. The air compressor is a two-cylinder compound and is attached to the engine crankcase with a special bolt. It is chain driven from the crankshaft. At 250 lb. pressure in the storage tank the compressor automatically stops until the tank again needs air. Lubrication is by splash and requires oil about once a month. The storage tank is attached to the rear of the chassis under the body. It is 7 in. in diameter and 30 in. long. Price, $49; installation, $5.—Newstarter Mfg. Co., 1901 South Western avenue, Chicago.

Standard Air Brush

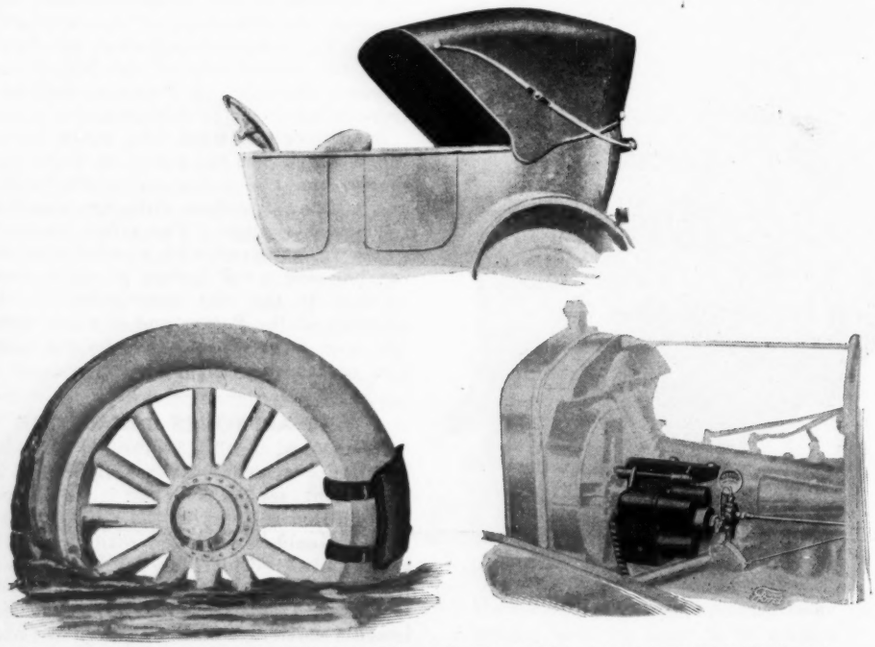
The Standard air brush for washing cars, trucks and so on is a labor-saving device for use in making car-washing easier. It can be used in connection with an extension handle, which brings the highest tops and most inaccessible places within easy reach of the operator. The brush is so designed that it can be used as a spray also.—Central Machine Co., 3609 South Ashland avenue, Chicago.

Colonial Tops

Two styles are furnished in the Colonial victoria tops, styles A and B. The tops are made of genuine leather lined inside to harmonize with the rest of the car. The purchaser can make his own selection of the cloth from samples. As an auxiliary to the tops the company has designed an extension cover which reaches from the front of the victoria to the top of the windshield with side curtains to keep off sun, wind or rain.—Auto Cape Top Co., 2334 Michigan avenue, Chicago.

Motor Dictograph

This motor dictograph has been adopted as standard equipment on fifteen makes of cars. It is supplied in various types, some for installation by the maker or body builder during construction of the car, others for installation in a finished car. Two push buttons are used to operate the dictograph, one to attract the attention of the chauffeur and the other for depression while speaking over the dictograph. Two dry cells are used, 3 volts, and the horn and loud speaker is adjustable to any position. The company maintains branch offices or agencies in some twenty-four cities to ad-



Above, Colonial victoria top; left, Terwedo mud shoe; right, Aero starter for Ford cars

just, repair and install its dictographs.—General Acoustic Co., 220 West Forty-second street, New York.

The Town Booster

On these pages is illustrated a town booster for the radiator cap of a car. The name of the town appears in highly polished raised letters on a background of black or green enamel. The device is made of solid brass with triple-plate nickel. On the back of the disk a small lug at the top and base provides a place to insert a flag or pennant. The emblem is 4 in. high, 3½ in. wide and weighs 7 oz.—A. F. H. Co., Dayton, Ohio.

Conform Piston Ring

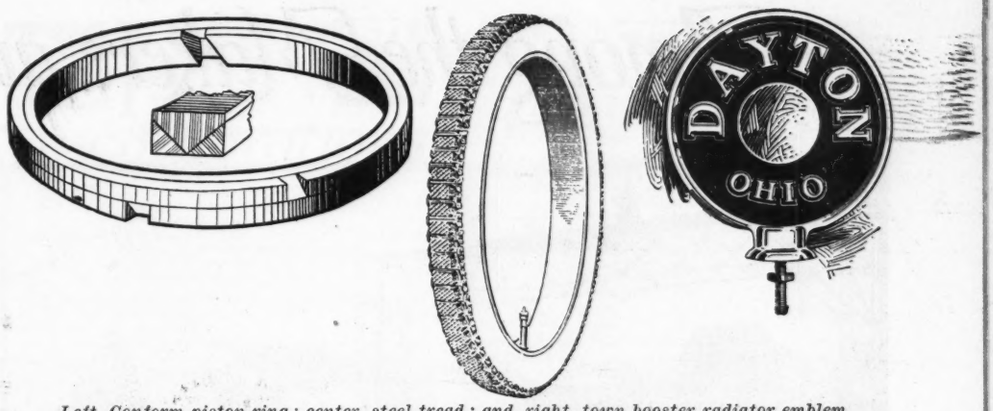
The R. & M. Conform piston rings are made in all sizes and carried in stock for any piston that requires a metallic packing ring. The ring is built on the principle of a soft leaf-spring. It consists of three elastic rings that fit together with angle contact, as illustrated. The maker claims that with this design two piston rings are enough for a piston.—Modern Electric & Machine Co., Indianapolis, Ind.

Evr-Lastin Gear Compound

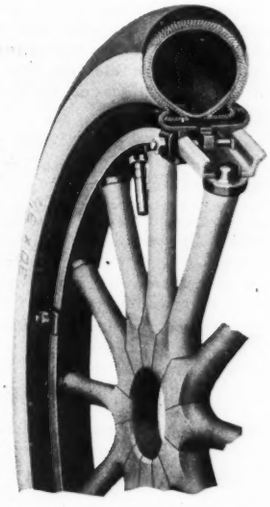
Evr-Lastin gear compound is composed of five products all relatively different. The lubricant clings to the surface under heavy pressure, preventing wear, and its density is such that it will find the tiny crevices, producing perfect lubrication, it is claimed. Its great advantage is said to lie in its ability to stick to the gear teeth under any strain, requiring less than many greases. The same compound is used for motor truck chains. To apply to chains use a brush. In cold weather the grease should be heated to a fluid state. The mineral used has a viscosity running high in the hundreds with cold test close to zero, the maker says. Prices, from 15 cents a pound in barrel lots to 25 cents a pound in 5-lb. tins.—Imperial Oil Co., 3124 Locust street, St. Louis, Mo.

Steel Tire Tread

The steel tread presents a shield to the face of the tire and is said practically to eliminate blowouts, punctures, skidding and many other evils that tires are susceptible to. The tread is linked together and thus is flexible. It primarily is intended for plain-tread tires, the inner contour being made to suit, but the same contour will fit many non-skid tires. The attachment is simple. The tire first is deflated. Then the steel tread is put over the tire. When the tire is inflated the amount of air pressure it relieves from the casing makes it so tight it becomes a component part of the tire, though separate from the rubber. Prices range from $7 for a tire 28 by 3 to $12.50 for a 36 by 4½-in. tire.—Steel Tread Tire Co., 20 East Jackson boulevard, Chicago.



Left, Conform piston ring; center, steel tread; and, right, town booster radiator emblem



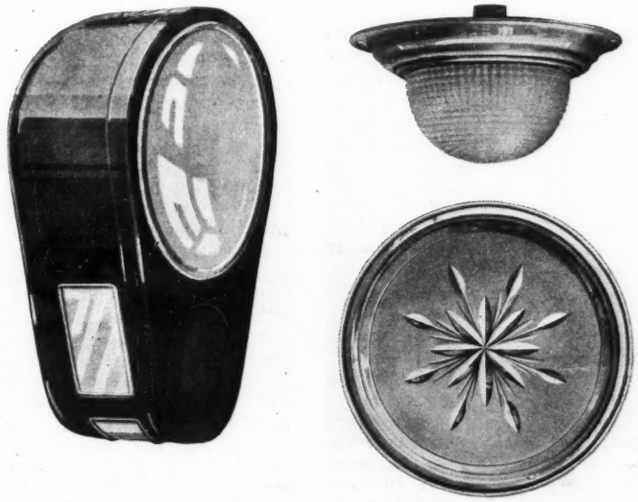
Kelsey wheel with metal felloe band

Metal Felloe Wheel

THE Kelsey Wheel Co. of Detroit has brought out a wheel with a metal felloe band in place of the usual wood type. The feature is conservation of wood, which is difficult to obtain at the present time, and also a wheel which is equal in strength and resiliency to the usual wood type at a lower cost.

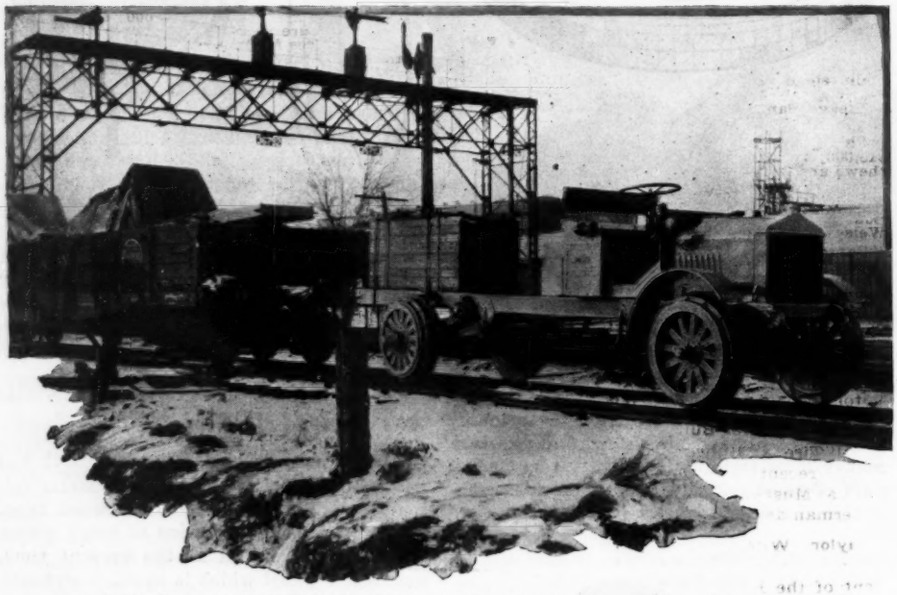
For some time the Kelsey company, which furnishes the majority of the manufacturers of passenger cars in and around Detroit with approximately 500,000 sets of wheels annually, has had its engineers working on this problem. Up to this time the Kelsey Co. has used a wood felloe band construction with the connection between the spoke and the felloe reinforced by a flange clip. This fastening device known as the "flanged-over edge" type has been used to strengthen the wood felloe and maintain the rigidity of the wheel. The substitution of the entire metal felloe gives a wheel for which the same service is claimed at a saving of half the wood required.

In the Kelsey construction steel felloe is used in an endless channel shape section, which is extensible and of a single piece. On each spoke is placed a stamped steel ferrule, which protects the spoke when going into the felloe, giving a weather-proof and check-proof joint. The wood spokes and ferrule are forced into the steel felloe under hydraulic pressure. They are turned true to size and mitred, both at the flange of the hub, and arranged in staggered relation. When glued, the spokes are forced under heavy pressure radially outward in a tenoning socket of the endless steel felloe by opposite pressure applied at the center of the wheel. This gives a high degree of tensioning and a permanent assemblage of the wheel. Although bolts are used in the hub, these are not depended upon to hold the spokes in place, as the tensioning is more than sufficient to take care of this. Tests on the 1¼-in. spoke size, corresponding to a tire size of 30 by 3½ in., show ability to support a radial load of 2000 lbs. One of the features which is claimed for the wheel is that the trouble which has heretofore developed in hot, dry districts has been overcome.



Left, Safety taillight; right, two Hoof dome lights

Among the Makers and Dealers



A TRUCK TURNS SWITCH ENGINE—Lack of switching engines was met by the Selden Truck Sales Co. in getting trucks from the factory out to the main line by a truck with flanged wheels. The haul was for 75 miles over an electric line. The truck carried a driver and a conductor with a train of two full loaded freight cars

BOWER Now With Buick—F. A. Bower, formerly chief engineer of the Weston-Mott Co. of Flint, Mich., is now engineer of the Buick Motor Co.

House Now With Hayes—S. A. House has resigned as sales manager of the Auto Wheel Co., Lansing, Mich., to assume similar duties for the Hayes Wheel Co. of Jackson, Mich.

Kerr Now With Mitchell—George W. Kerr, formerly body engineer of the Reo Motor Car Co., Lansing, Mich., is now manager of the body department of the Mitchell Motors Co., Racine, Wis.

Madison Leases Space for Tractor—A part of the plant of the Madison Motors Co., Anderson, Ind., has been leased to the Fulton Tractor Co., recently incorporated for $1,000,000, and the production of tractors will be undertaken at once.

Biggam Trailer Gets Contract—The Biggam Trailer Co., Corunna, Mich., has been awarded a $250,000 contract by the Government for trailers, work on which has already been started. The company moved to Corunna a year ago from Detroit, buying the old Fox and Mason factories.

Willard Battery Makes Changes—I. K. Schnaitter, formerly credit manager of the Willard Storage Battery Co., Cleveland, Ohio, has been appointed assistant and treasurer of the company. H. M. Adams has been appointed district manager with headquarters in New York, succeeding A. W. Sayer, who has been recalled to the main office.

Gramm-Bernstein Is Expanding — The Gramm-Bernstein Motor Truck Co., Lima, Ohio, recently completed and is occupying its factory additions which permit the adoption of the progressive assembly system. The two new additions are larger than the main body of the original plant, not including the various departments housed in the smaller buildings going to make up the entire plant. The new additions are two buildings 180 by 240 ft. The company has also completed a new receiving, shipping and stockroom, 48 by 220 ft., with a loading platform accommodating eight freight cars. A three-story administration building is now under construction.

Maurer Leaves Lewis Spring—Edward Maurer has resigned as chief engineer of the Lewis Spring & Axle Co. of Chelsea, Mich., to accept a position as superintendent of shops of the Solvay Process Co. of Detroit.

Hawkeye Truck Increasing Capacity—The Hawkeye Truck Co., Sioux City, Iowa, which was organized about a year and a half ago, already has outgrown its quarters and is erecting a new building which will give a capacity of from 600 to 800 trucks a year. It is expected that the building will be completed by June 1.

Cory Special Factory Representative—James P. Cory, formerly with the Pacific KisselKar forces, distributor for the Federal truck on the coast and in the far western states, has been appointed district factory representative of the Federal Motor Truck Co. of Detroit. Mr. Cory will work under the jurisdiction of and in co-operation with the commercial car department of the Kissel company.

Myers Commercial Cars Now—The Myers Machine Co., Sheboygan, Wis., which has been manufacturing commercial cars trademarked Wisconsin, for the last year and a half, is completing arrangements for largely increasing its output to handle domestic commercial orders. A new model of 2½ tons' capacity is now in production and supplements the 1½ ton vehicle upon which the concern heretofore has concentrated.

Olds Uses Trolley to Ship—The Olds Motor Works, Lansing, Mich., is shipping cars out by trolley. The company thus reaches Detroit in one direction and Kalamazoo in the other. As the trolley cars are short a strong stanchion is erected about a third of the length of the car from one end, and upon this the front wheels of a car are elevated. Two additional cars then are loaded on the bed of the flat, the middle car extending underneath the one elevated on the stanchion. By this contrivance the Olds company suceeds in loading three cars on the trolley flats.

Samson Tractor Doubles Plant—The capacity of the Samson Sieve Grip tractor plant at Stockton, Cal., has been doubled by the erection of two new buildings, one of which will be utilized as an erection plant and the other for storage purposes.

Smith Truck Promotes Woodward—L. A. Woodward, southern sales manager of the Smith Motor Truck Corp., with headquarters in Atlanta, Ga., has been promoted to be executive sales manager of the company and will have his headquarters in Chicago.

Larger Quarters for Wohlrab—The Wohlrab Gear Co., Racine, Wis., which has been conducting its manufacturing operations in part of the former plant of the Wisconsin Engine Co. at Corliss, Racine county, for several years, has completed arrangements for the establishment of a factory at Racine, Wis., in which the output will be greatly increased.

White Heads Baker R. & L.—Fred R. White, formerly first vice-president of the Baker R. & L. Co., Cleveland, has been elected president, succeeding Charles L. F. Wieber, who was elected chairman of the board of directors, retiring from active participation in the business. E. J. Bartlett has been elected first vice-president and general manager to fill the place vacated by Mr. White.

Former Briscoe Men in South—Frank Smith, until recently sales manager and one of the organizers of the Briscoe Motor Corp., Jackson, Mich., is now in charge of sales for the J. & D. Tire Co., Charlotte, N. C. R. L. DeLissor, formerly branch manager of the Columbia Motors Co. of Detroit, and assistant sales manager of the Briscoe corporation, has been appointed eastern sales manager of the J. & D. Tire Co.

Wolverine Tractor Acquires Site—The Wolverine Tractor Co., organized in Detroit about two years ago with a capital stock of $500,000 has acquired a tract of land of approximately 40 acres, on which it is planned to erect a plant for the manufacture of tractors on a large scale. The principal stockholder is W. E. Wood, head of the W. E. Wood Construction Co. of Detroit, which built the big plants for the Ford, Chevrolet and Buick companies.

First Unit of Haskelite Completed—The first of a group of units to be built by the new Haskelite Co., which will manufacture special veneer airplane parts, has reached completion and is ready for the installation of machinery. The dimensions of the plant are 200 by 525 ft. and it contains 2½ acres of floor space. Between 500 and 600 persons will be employed in this one unit alone. Another building may be erected and ready for occupancy about July 1, 1919.

To Make New Starter—The Lauchin Air-Starter & Tire Inflator Co. has been organized at Green Bay, Wis., with a capital stock of $50,000 to engage in the manufacture of a combination engine starting and tire pumping device designed and patented by George Y. Lauchin, formerly of Crystal Falls, Mich., and now located in Green Bay. Arrangements have been completed for the establishment of a factory and materials purchased for an initial output of 500 of the devices. The starter-inflator is designed for application to any make of car. Officers of the company are: President, Joseph F. Rothe; vice-presi-

Alma, Mich.—Alma Electric & Battery Co.; capital stock, $5,000; incorporators, G. A. Trombley, J. H. Ackerman, F. H. Witters and Z. Lalonde.

Akron, Ohio—Royal Tire & Supply Co.; capital stock, $10,000; incorporators, W. E. Renneckar, Mae L. Renneckar, J. O. Surbey, Carie I. Surbey, F. S. Lichtenwalter and Nettie M. Lichtenwalter.

Arkon, Ohio—R. & R. Taxicab & Transfer Co.; capital stock, $20,000; incorporators, Solomon Rothenberg, Louis Rosenback, Frank B. Burch, Harry G. Ream and Earnest C. Martin.

Akron, Ohio—Paragon Motor Freight Co.; capital stock, $50,000; incorporators, Max Bogatin, F. C. Newman, Clarence H. Clay, W. H. Hyatt and G. B. Metz.

Cleveland, Ohio—Lee Royal Aviation & Engineering Mfg. Co.; capital stock, $100,000; incorporators, L. R. Carpenter, Harry A. Shook, W. Ross Armour, G. S. Lawson and John R. Olderman.

Cleveland, Ohio—Combined Knowledge Tire & Repair Co.; capital stock, $30,000; incorporators, Harry D. Bates, John J. Karkoff, James H. Rooke, George W. Sinclair and J. F. Merrick.

Cleveland, Ohio—Motor Service Co.; capital stock, $150,000; incorporators, Charles Dehn, A. W. Born, Carl Baumgardner, D. R. Knisely and W. C. Wing.

Recent Incorporations

Cleveland, Ohio—Storage Battery Rebuilding Co.; capital stock, $15,000; incorporators, Henry L. Beggs, Samuel L. Bowlus, Lawrence C. Meyer, Arthur W. Longbarger and Gilbert J. Spencer.

Chicago—Brunt Auto Sales Co.; capital stock, $15,000; incorporators, T. J. Peden, J. H. Matthews and H. A. Quinn.

Columbus, Ohio—Walnut Street Auto & Storage Co.; capital stock, $10,000; incorporators, Louis Weiss, Benjamine W. Gateman, Samuel Weiss, Martin Weiss and D. Gateman.

Canton, Ohio—S. W. Cashner Motor Car Co.; capital stock, $125,000; incorporators, S. W. Cashner, P. L. Heckman, A. R. Lemmon, L. F. Cunningham and James E. Robinson.

Cincinnati, Ohio—Ross-Lambert Rubber Co.; capital stock, $3,000,000; incorporators, Charles E. Ross, C. H. Lambert, Samuel Savin, Charles H. Adams and A. B. Lambert.

Milwaukee, Wis.—United States Aero Propeller Co.; capital stock, $30,000; to manufacture propellers and other parts for airplanes; incorporators, Fordyce H. Bottum, Frank L. McNamara and John H. Hurley.

Milwaukee, Wis.—Horizontal Hydraulic Hoist & Body Co.; capital stock, $50,000; to engage in the manufacture of automatic dump bodies and hoisting devices for motor trucks; incorporators, Charles F. Millmann, Edward R. Bacon and Benjamin A. Reese.

Peoria, Ill.—Safety Signal Corp.; capital stock, $200,000; to manufacture a safety device for motor cars; incorporators, B. F. Hardesty, W. H. Kirk and H. O. Johnson.

Superior, Wis.—Superior Oil Co.; capital stock, $25,000; incorporators, Donald R. Searle, John H. Cummins and Joseph Kreiziger.

Wilmington, Del.—Advance Motor Truck Co.; capital stock, $2,000,000; incorporators; M. M. Clancy and Clement M. Enger.

Wilmington, Del.—Automobile Electric Equipment Co.; capital stock, $100,000; to manufacture and install storage batteries; incorporators, C. L. Rimlinger, M. M. Clancy and Clement Enger.

dent, Anton Loehr, Hilbert, Wis.; secretary, R. B. Vockery; treasurer, John J. Madler, Hilbert; general manager, George L. Lauchin.

Brown to Manage Sanford Sales—F. C. Brown has been appointed advertising and sales manager of the Sanford Motor Truck Co., Syracuse, N. Y.

Locomobile Manager in Aviation Corps—Donald Anthony, manager of the Baltimore branch of the Locomobile Co., has resigned and joined the aviation corps. F. B. Wilson will succeed him at Baltimore.

Tri-Cities on Cash Basis Soon—Motor car repair work in Rock Island, Ill.; Moline, Ill., and Davenport, Iowa, will be put upon a strictly cash basis after May 1, the Tri-City Trade Association has decided. The new rule will also apply to supplies of all kinds.

Cozzens with Topp-Stewart—Fred H. Cozzens has been appointed general sales manager of the Topp-Stewart Tractor Co., Clintonville, Wis. Mr. Cozzens formerly was with the Four Wheel Drive Auto Co. The Topp-Stewart new factory will be in production within thirty days.

Eckenrode a Fuller & Sons Manager—J. E. Eckenrode has been appointed central district sales manager of Fuller & Sons. Mfg. Co., Kalamazoo, Mich., with headquarters in Detroit, succeeding Gould Allen, who resigned April 1 to become manager of the Detroit office of the Wetzell-Hall Co.

Lumb Truck Plant Moves—The Lumb Motor Truck & Tractor Co., Aurora, Ill., which recently was absorbed by the Pan-American, has removed to Decatur and been consolidated with the Pan-American plant. The sales, engineering and mechanical forces of the two companies have been consolidated and the manufacture of trucks will be carried on at the same time with that of passenger cars.

New Plug in Quantity Production—The Kant Miss Spark Plug Co., which was organized at Green Bay, Wis., several months ago with a capital stock of $100,000, has completed arrangements for quantity production after manufacturing the plug on a limited scale for some time past. The plug was designed by B. E. Coburn, Green Bay, who is vice-president and secretary of the company. W. D. Cooke is president and treasurer.

Falls Motors Adds to Plant—To provide facilities to bring its production to the point required by its extensive contracts, the Falls Motors Corp., Sheboygan Falls, Wis., will erect a new one-story shop building, 60 by 135 ft., costing about $35,000 equipped, and upon the completion of the structure intends to make further extensions. The Falls company has been working on large contracts for aircraft motive power for Government contractors for many months and recently took a contract for building standardized truck engines which will be supplied to the Kissel Motor Car Co., Hartford, Wis.

Sectional Tire Building Plant—The Sectional Tire & Rubber Co., a $50,000 corporation, recently organized, is establishing a plant at Muskegon Heights, Mich., with G. W. Kitterman as manager of the factory.

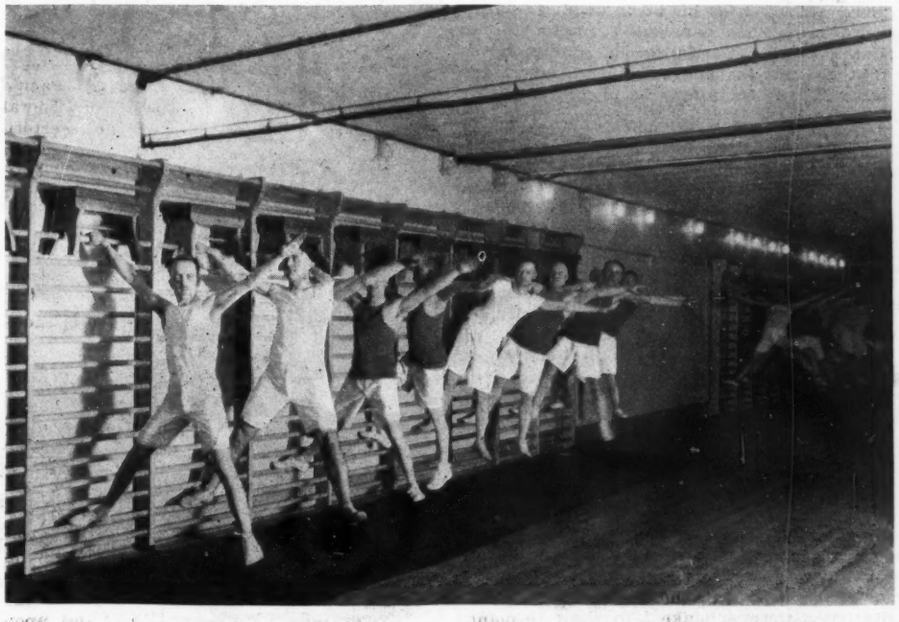
Taylor With Interstate Tractor—James Taylor, formerly in the production department of the King Motor Car Co. of Detroit, has been appointed chief inspector for the Interstate Tractor Co. of Waterloo, Iowa.

Stanley Will Manage Bourne Production—Robert W. Stanley, formerly with the Entz transmission works, has been appointed chief engineer and production manager of the Bourne Magnetic Truck Co., New York. The Bourne company makes 2 and 3½-ton trucks equipped with magnetic transmission.

Ampco to Have New Plant—The Ampco Rolling Mills Corp. has started remodeling and re-equipping the plant of the former Globe Iron Works, Menomonie, Wis., into a foundry, wire and rolling mill. A large electric furnace will be installed, together with other equipment. The company will manufacture a variety of products out of Ampco bronze and will make a specialty of airplane wire and cable, bronze gears, shafts and similar goods. The material is made by a secret formula discovered by H. Littman of Milwaukee and has been in production on a large scale for three years or more.

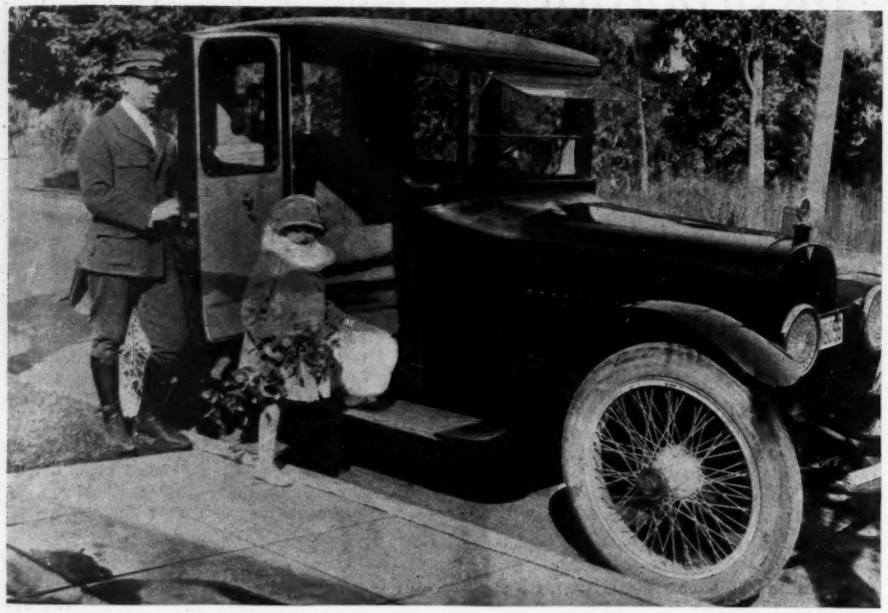
Amazon Promotes Moynihan—Owen Moynihan has been appointed general sales manager of the Amazon Rubber Co., Akron, O. Hs is succeeded as New York district manager by Fred H. Findley.

New Truck Completes Plant—The plant of the Four-Wheel-Drive Truck Co., Webberville, Mich., organized about six months ago with a capital of $50,000, is now complete and the manufacture of the first 2-ton truck is under way. The officers of the company are: President and assistant treasurer, Ashmon Catlin; secretary and manager, Frank Young; vice-president, F. D. Welfare; and treasurer, W. W. Thorburn. The Four Wheel Drive Truck Co. will start work immediately on two new factory buildings. One of them will be occupied as an administration building and will be 30 by 40 ft. and is to be built in front of the present building. The other is a separate building to be used as a wood shop and blacksmith shop. The Four Wheel Drive Sales Co. has been organized by Harry Herndon and B. F. Hall, Jr., of Lansing, Mich., who have contracted for the entire output for two years.



THEY'RE PAID TO DO THIS—White pays these men, and its other employees, to exercise an hour a day in a gymnasium it built for this purpose. The men are paid by the company for the time they spend in the gym and a heavy fine punishes failure to report for class and go through the exercises

From the Four Winds



WHEN BABY STARS GO OUT—Or so this picture might be titled, for it is one of Baby Marie Osborne with her very own car in wh ich she goes to the moving picture studio

264,466 California Cars First Quarter—Up to March 26 of this year California had registered 264,466 cars; 15,571 motorcycles; 7505 chauffeurs; 1846 motor car dealers; 116 motorcycle dealers; 159 trailers.

Columbus Motorists in Country Quarters—A country club will be established on the Miller farm 10 miles east of Columbus, Ohio, for the exclusive use of members of the Columbus Automobile Club and their families. Slides and swings for children, bathing and wading facilities will be available.

Dealer Helps Spring Gardens—F. S. Bliven, manager of the Standard Motor Co., Baltimore, Md., is doing his bit in helping to grow more crops. He has lent a tractor to the Home Garden Committee of Baltimore so that grounds in backyards, large lawns and other vacant spots may be ploughed quickly for planting.

Missouri Registrations Begin Early—During January, February and March, Missouri issued number plates, chauffeur badges, etc., as follows: 145,015 owners, 1395 dealers, 1975 motorcycles, 13,699 chauffeur badges. The total registration for 1917 was 151,027. Judging by the number of new cars registered thus far, the reports of sales made to the motor vehicle department by the dealers and the demand for application blanks the registration this year will not fall far short of the 200,000 mark.

St. Louis After Car Thieves—To stop thefts of motor cars has been undertaken by a conference committee representing the Automobile Manufacturers' and Dealers' Association, the St. Louis Automobile Club, chamber of commerce and the municipal legislative committee. The first step was to order an attorney retained to watch the prosecution of all motor car thieves and oppose any move for pardon or other leniency after conviction. Statistics were submitted to show that the value of stolen cars was five times that of all other stolen property in this city and that the police department assigned only five detectives to this work and 125 to other t[illegible]s. The reasons for the popularity of the [illegible]bbery, it was stated, were the failure to ge[illegible] convictions of thieves and the light sentences when conviction could not be evaded and after that paroles..

Illinois Licenses Increase 59,579—Illinois apparently is buying more motor cars than ever before. This is demonstrated by the fees collected for license plates. The sum collected during the first quarter of the present year was $1,751,515, an increase of $886,872. The licenses issued this year aggregate 234,413, an increase of 59,579, the latter figure representing the number of new cars in use.

Road Association Broadens Name—The East Michigan Pike Association has changed its name to the East Michigan Pikes Association. This is to include the improvement of what is known as the Over-the-Top of Michigan route from Saginaw to Midland, Gladwin, Grayling and Mackinaw City, now being promoted and developed.

Goodyear Wireless Students Graduate—The classes in wireless telegraphy that were started in the factory school of the Goodyear Tire & Rubber Co., Akron, Ohio, last January have completed their work. The men have been sent to the Government school at the Carnegie institute at Pittsburgh to complete their training for the Signal Corps.

140,000 Mileage Record Made—A Haynes light six has piled up a mileage record of 140,000 miles in the last two years and a half—and is still running smoothly. The car is in the bus business in New Orleans. The affidavit now on display at the salesrooms of the New Orleans agency gives a fuel average of 17 m.p.g. and a cost upkeep of not more than $50.

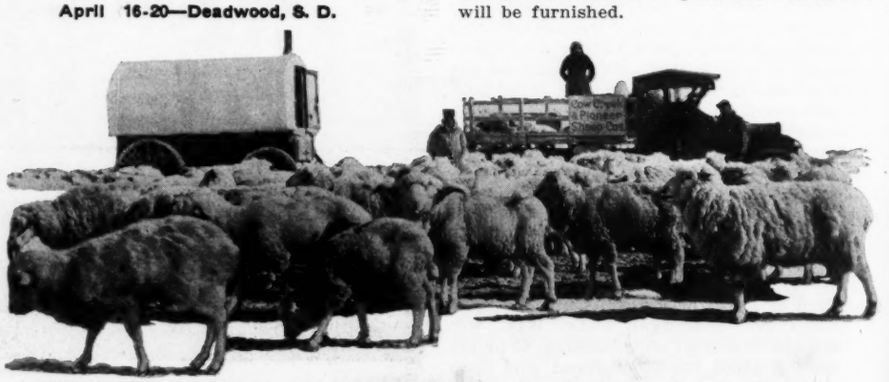
Tri-City Holds Joint Show—The example of Bloomington, Ill., in holding a joint show of cars at the same time in each salesroom, as well as failure to get a suitable building, induced the Tri-City Automobile Trade Association to go and do likewise. Davenport, Rock Island and Moline have no building large enough for all the dealer-members to exhibit, and for this reason the annual show has practically been abandoned. Any dealer with a patron who fails to find the kind of car he wants will take that patron to one of his competitors who may have the type sought.

Starts Garden Contest—The Sears Auto Co., Des Moines, Iowa, believes the daylight saving law was made for the benefit of the food producer and to back up this patriotic move has announced an elaborate gardening contest for the employees. A prize of $25 will be given for the best garden June 1. The gardens are to be judged on five different points, percentage of ground used, general appearance, practicability, general condition of the plants themselves and the assortment. The employees by the rules of the contest must receive help from only one person in his immediate family, outside of the work of plowing the ground. In case employees do not have funds to purchase the seed it will be furnished.

Coming Motor Events

SHOWS

Sept. 14-21— Chicago.
April 16-20—Savannah, Ga.
April 16-20—Deadwood, S. D.



SHEEP HERDING WITH A TRUCK—A w oman with a truck saved many hundreds of sheep from starving during the blizzards in Wyoming last winter. The loss in the flock was under 3 per cent, though lack of food sometimes makes the loss in herds for this reason 35 per cent in winter